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# GAS LIGHT JOURNAL

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[OFFICIAL NOTICE.]

### Ohio Gas Light Association.

OFFICE OF SECRETARY,
COLUMBUS, O., February 16, 1889.

In connection with the Fifth Annual Meeting of the Ohio Gas Light Association, at Mansfield, Ohio, March 20 and 21, 1889, there will be an exhibition of gas stoves, engines, burners, electric motors and any and all kinds of apparatus and appliances of interest to gas men and the lighting fraternity. You are cordially invited and requested to contribute to this exhibit something in your line of goods or manufacture.

An exhibition of this kind was announced last year for the annual meeting at Sandusky, Ohio, and while it constituted an interesting feature of the meeting, it was only partially successful, on account of the extremely short notice that was given to manufacturers and dealers who desired to display their goods. The present notification, however, is given sufficiently in advance to allow all who desire to do so ample time in which to prepare their exhibits and have them in position at the opening of the meeting.

A large room for this display has been secured close to the place of meeting, which will be free to all exhibiters. Consignments of articles for the exhibition and inquiries for information as to details of the arrangements must be sent to Mr. Geo. S. Harris, Supt. Gas and Electric Light Companies, Mansfield, Ohio, who will give prompt and careful attention to all matters connected with the exhibit, and assist in arranging the display to the best satisfaction of all concerned.

It is hoped that you will appreciate and utilize this excellent opportunity to advertise your goods and bring them conspicuously to the attention of the practical men who will be in attendance at the meeting.

Very respectfully,
IRVIN BUTTERWORTH, Secy.

[OFFICIAL NOTICE.]

### Second Annual Meeting of the Southwestern Gas Association.

FORT WORTH, TEXAS, Feb. 11, 1889.

The Second Annual Meeting of the South Western Gas Association will be held at Austin, Texas, Tuesday, March 19, 1889. It is earnestly requested that every member of the Association will make arrangements to be there. Matters of importance will come up for consideration, and a full attendance is desired.

There will be several interesting papers presented, and a good time generally is expected.

Austin is a city of especial interest to the fraternity, and in fact to everyone, being the central ray of that effulgent orb known as the Lone Star, Texas.

To those engaged in the gas business in Louisiana, Arkansas, Kansas, Colorado, New Mexico and Texas a cordial invitation is extended to join us and lend their aid and influence in the common cause—mutual improvement. This is not a Texas institution, but is designed to bring the gas men of the great South West into a union where they can compare experiences which are peculiar to our locality. Don't forget to come.

THOS. D. MILLER, Secy.

## BRIEFLY TOLD.

AN EXHIBIT OF GAS APPLIANCES AT THE MANSFIELD MEETING.—In its proper place will be found an invitation from Secretary Butterworth, of the Ohio Association, to the manufacturers of and dealers in apparatus by means of which gas is consumed, and we note the information, that such an invitation has been extended, with great satisfaction. It is a step in advance, and one that ought to meet with the hearty approval and active co-operation of the manufacturers, who are thus afforded an opportunity for practical advertising gained at a comparatively small outlay of money. It is true that the exhibition will not cover a prolonged period, but the nature of the audience that will attend it makes ample amends for the sparseness of time over which it will continue. In the ordinary run of mercantile or industrial fairs, such as obtain in our larger cities, the manufacturers of gas engines, cookers, heaters, etc., often go to considerable trouble and expense in arranging for a display of their goods; and do so wisely, too, we think. Still, they must depend on attracting the attention of the general public to their wares, while in the instance of a display such as that proposed at Mansfield they are to have specialists to look over their wares; and each one of the specialists is not only willing but anxious to examine with a strong inclination to purchase. The exhibit last year at Sandusky, as remarked by Secretary Butterworth, was an interesting feature of the convention, and well repaid those who participated in it, either in the capacity of an exhibitor or as an inspector; and the only reason why the affair was not carried out on an exceedingly larger scale was because of the limited time intervening between the conception of the project and the days for putting it into execution. This objection, however, is deprived of any force in respect of the Mansfield exhibit, for the notice takes time at the right period. We must say that it is extremely clever on the part of Mr. Harris to submit with such grace to the irksome duty of taking care of the preliminaries of the proposed display; but it is this desire of helping a good work along which has placed the Ohio (and the Western as well) Association well up in the history of such bodies, even though both are youthful when compared with the other existing kindred bodies. We suppose that the electric supplies dealers will not be slow to take advantage of the invitation; for no doubt their goods are now fairly entitled to rank as "kinds of apparatus and appliances of interest to gas men and the lighting fraternity." And with all proper respect to Secretary Butterworth, we think he must have allowed his pen to slip toward the end of the quoted phrase; for we would ask, if the gas men are not *the* lighting fraternity, who are? And this pondering leads on to the remark that the printed list of subjects includes a query which is to be made again before the Ohio Association, and one which we thought had been disposed of at the meeting last year. This query is as to whether the formal title of the Asssociation shall be altered to that of the "Ohio Gas and Electric Light Association." For our part we hope that the answer to this proposition shall be well negatived; for the engagement by a gas company in the dual supply does not by any means imply that that company does not nor will not consider the supply of gas as any the less an important factor in its business than when the supply of electricity was undreamed of by it.

From other and "unofficial" sources we learn that the general proceedings of the Mansfield conclave bid fair to be at least as interesting to the members, and to the gas fraternity in general, as any of those of former years, which is saying a great deal. Furthermore, Secretary Butterworth's efforts, which have been directed with his usual force and promptitude, must be awarded a round meed of praise. In fact, all the Associations seem to have been especially favored in the caliber of the men selected to carry on the always arduous, besides not often unpleasant duties connected with the Secretary's chair.

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THE SECOND ANNUAL OF THE SOUTHWESTERN ASSOCIATION.—This issue also contains an announcement from Secretary Miller, of the Southwestern Association, whose pleading from Fort Worth for a good attendance next month at the Austin gathering ought to receive prompt recognition from the fraternity of the great and growing southwest. As we remarked last summer, the choice of March 19th was unfortunate, in that it might preclude some from visiting the capital of the Lone Star State who would otherwise be on hand. There is no possible reason why this Association should not prosper, for its home is in a territory which holds many energetic and promising gas men. One thing might militate against it, which time, however, may be trusted to remove, and that is the fact that one can travel with greater comfort from New York to Austin than were he to start out for the same point from localities much nearer thereto than is the capital of the Empire State. And comfort in these days implies a great deal to the traveller. The very energy, too, now being developed in the southwestern States—particularly in the instance of Texas—might constitute a reason why the gas man could not make it convenient to spend the time away from home necessary to "do" the Convention. Of course it is not very easy for the average denizen of the Eastern and Middle States to understand all that a doubling up of the population of a town once in every three years means; but the gas man can understand it, partly, at least. Take, for instance, the statement from Secretary White, of the Fresno (Cal.) Company, which appears in our current item columns. There we find that the Fresno of 1885–6 had a population of 1,000, whereas the Fresno of to-day houses 15,000 people! Who can forecast the want of to-morrow by the demand of to-day in a place such as that? And who can predict that the ratio of increase is to keep pace on either the plus or minus end with the ratio of that already written down? Indeed, we can all readily understand, however, the force of Secretary White's remark that such growth demands a rapid outlay of "coin" to keep pace in the appeasement of the wants so created; and we might go further with him and say that not only is "coin" to count in the contest, but that pluck and tirelessness must accompany the spreading and purchasing powers of the yellow metal. As it is in Fresno, almost so is it at Fort Worth, Austin, and other Texas points; and this forcefully illustrates Secretary Miller's remarks that "This is not a Texas institution, but is designed to bring the gas men of the great South West into a union where they can compare experiences which *are peculiar to our locality*." As the phrase goes in that southwestern country, "That's right!" and this being the case, we can conceive of no more rational way of solving the peculiar problems in the gas business there presented than by gathering in council for the discussion of what to do and how to do it. No teapot policy can win in the Southwest, any more than it can succeed in the Northeast. A good grasp of the factors composing the situation will lead to the knowledge of how to bend the factors in the line of securing strength, and that Austin in March will be a likely spot to formulate the necessary policy goes without saying. Pack your grips, then, gentlemen; and make the journey in the knowledge that it shall not have been made in vain, and we will be there, if such a thing is possible. In connection with this meeting we herewith publish a letter from President Beck, of Galveston, Texas, to Secretary Miller. All the comment that it calls for is the simple one that it is Beck all over—manly, frank and plain:

"GALVESTON, TEXAS, February 11, 1889.

"MR. THOS. D. MILLER, Secretary:

"Fort Worth, Texas—Dear Sir:—In answer to yours of recent date regarding the Southwestern Gas Association, permit me to state that in my opinion our past attempts to form an Association were too hasty; that is, we were not properly organized. We requested papers from our members, and, I am sorry to say, when the meeting came some of our brethren did not appear, and the general attendance was decidedly small. Now, my friend, I would suggest that we once more notify all practical men of the gas profession that there is such an Association as ours in existence, and that for our mutual benefit we desire everyone to attend the meeting at Austin, and wish any subject that they feel inclined to bring before that meeting to be prepared in the shape of a paper. This meeting will be a final test as to what future we can expect. Papers without members will be of little or no advantage. My experience with Association meetings has taught me that the greatest value derived from such meetings is the discussion in general of various matters relative to our vocation. Should our expectations be realized by having a large attendance, then let us organize in proper form, thereby placing ourselves in position to conduct our meetings upon a more beneficial and satisfactory basis. Yours, very truly, FRANK BECK, President."

Now let us hope that President Beck will receive that encouragement which it was implied would be readily and freely granted him when he accepted the Presidency of the Association. For our part we wish the time had been named for at least a fortnight later.

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THE meeting at Boston was an unqualified success. Rather than now give meager expression to our opinion respecting it, we postpone any comment until next Monday.

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PRESIDENT WARMINGTON'S smile has lost none of its serenity since the action taken last week by the City Council of Cleveland, Ohio, on the Hull ordinance authorizing the Cleveland Fuel, Power and Lighting Company to operate a gas works in the city, was placed on the record. As a consequence of the report made by the special committee having the matter in charge, a motion to indefinitely postpone action on the ordinance was carried. This was followed by a motion to reconsider that action, which was rejected, which prevents the subject from being debated again during the term of office of the present Council. The report of the special committee, respecting its visit to Jackson, Mich., where an investigation of consuming cheap water gas through the medium of the Fahnehjelm combs was had, is at once amusing and instructive. We hope soon to give a *resume* of this report.

## Notes and Comments.

By OBSERVER.

In my last article, at the beginning of the second paragraph, the word "*non*" should be omitted so as to read:

"Another disadvantage that I seem to see in a *union* of the twin interests," etc.

In referring to the gas business I do not presume to write for those who have made it a life-long study, and at whose feet I consider it a privilege to sit. The gas business might be compared to a farm. If it is well managed it will pay, otherwise it will not. Hence the importance of having a good man at the helm. I think Mr. Thomas Turner has said that in the earlier days of gas lighting some of its since followers "drifted" into the business. Since then there has doubtless been a great improvement in this regard, and room, possibly, for still more. In these days of the sharpest competition that the world ever saw no business house can afford to allow anyone to drift into a responsible position in its service. Neither can a gas company.

It is sometimes said, "We cannot afford to employ an experienced superintendent on our small works;" to which my rejoinder is, "You cannot afford to be without one." No gas works, no matter how small, should be placed in charge of an inexperienced, and therefore an incompetent person, any more than should a locomotive be put in charge of an unskilled engineer, or an electric light plant be handed over to an inexperienced electrician. Neither should a gas works be permitted to *run itself*—a head, and a competent head, is absolutely necessary.

In the general plan and construction of a gas plant many things have to be carefully watched. To obtain this oversight a good consulting engineer should be placed in charge. It does not follow that the mason who has helped to erect 12-story buildings can set retorts or build a good gasholder tank.

In laying out a plant special care should be paid to distances, the route the gas will traverse, etc. The retort house should not be near the purifying house, nor the steam boiler near the condensers. It is well to build the retort house, purifying house, etc., large enough to receive any extensions that may be anticipated in the near future. All of these buildings should be well lighted and well ventilated. If the ground is poor and piling is necessary to secure a good foundation for the retort stack, the supports should be driven deep enough to be beyond the reach of the heat from the benches. Twice in my life have I seen the piling so badly burned that the foundations were destroyed, and the benches had to be entirely taken down to prevent them from falling down.

I will touch upon the settings only to say that each engineer must be governed by his surroundings and the demands of the place. The ascension pipe should not be smaller than 5-inch, and the hydraulic should be placed well up from the stack; for it is desired to make gas at this point, not pitch. Of late years many gas engineers have run to high heats, but I think it will appear to anyone conversant with the business that there is a point in this practice beyond which it is not best to go. It is not best to open for drawing and charging an entire bench at one time. This cools the bench to such an extent that it does not recover from it for some time; better to open half of the bench at one hour, and the other half the next hour. I think four-hour charges are the most popular; but still this question has two sides. I believe the quicker the gas can be taken out of the retort after it is made the better; but *after* that give it plenty of time—haste is detrimental to it as an illuminant. The same may be said of cooling it too rapidly. It should be allowed to cool slowly and gradually. A pipe to convey it all around the retort house before it enters the condenser is a good thing. In taking the gas from the hydraulic main I prefer to have the latter constructed in sections, one for each bench, with a line pipe at back of it, this line pipe to be connected to the hydraulic main by means of a pipe to each bench, suitably valved, to shut the exhauster off from the bench that may be *down*—this pipe to enter the hydraulic main at the tar level, and so convey to the line pipe and away all the constituents of the gas, holding them together and allowing the gas to cool slowly, and, as I think, insuring a fixed gas, with the hydrocarbons or light-giving properties retained in it—incorporated with it, and reducing naphthaline to a minimum possibility.

In this country I notice the exhauster is placed directly after the hydraulic main, whereas in Europe, I believe, it is usually placed after the condenser, thus taking the gas after the heavy tarry matter has been dropped in the condenser. I believe our gas engineers advance the theory that the tar acts as a lubricant on the exhauster (I refer, of course, to the rotary type), but I think there is still sufficient tar left in the gas to answer this purpose, and that of a lighter kind; further, by holding out this heavy tar is not the volume of gas reduced, thus lightening the work of the exhauster—or, in other words, increasing its capacity? If the reader will not accuse me of a desire to advertise any line of manufacture I will, in passing, say the Pelouze and Audouin condenser is a good thing.

We now come to the scrubber or washer. Coke is often used on the trays, for the gas to "rub against it." I think carbon, as taken from the retorts, is better; being harder than coke it is less liable to break off and clog up or mass together on the trays. I have seen shavings or wood chips from a planing mill used; but from these articles please excuse me.

*Do not use pure water to wash with*, unless you want to take the very *life* out of your gas. A small stream or spray of water is little better than nothing, and as a large quantity of pure water cannot be used with safety, take the water from the warm well—the ammoniacal liquor, for which the gas has some affinity—and wash with it. The liquor is also rendered more valuable for chemical purposes by being pumped through the scrubber several times.

In the purifying house we have four purifiers, set in line, or forming a square, as most convenient, with a dry center valve; also, a fifth box, to take the gas after it has passed through the others. In this decade oxide of iron has gained rapidly in favor and use as a purifying material. It is cheaper, and pleasanter to handle than lime, although it will not remove all that the lime will. Carbonic acid, which the iron does not reach, is not only an impurity, but is injurious to the candle power. I am aware that some of our best gas engineers overcome this latter trouble by using more enriching material; but the impurity *remains*. Right here the fifth purifier comes in; for where the other four are charged wholly with oxide, the fifth, being charged with lime, will take up what the others pass, and in the event of a leaky center valve, or if any crude gas should pass the latter when a purifier is being changed, the fifth takes it. Where only four boxes are employed, I think one tier (the bottom one) should be charged with lime—the presumption being that oxide is used.

It would seem scarcely necessary to speak as to the changing of the boxes, but it is a fact that some gas superintendents are changing on the last purifier—that is, they wait until the last purifier "touches" the paper. In this way I contend it is impossible, almost, to prevent the passage of dirty gas to the holder. The change should be made when the middle purifier discolors the paper quickly, thus constantly keeping one clean box in use. There are others who change once in so often, regardless of the condition of the gas or of the purifying material. Thus a purifier is sometimes changed sooner than necessary; at other times, not soon enough. This may be good "thumb rule," but is not admissible.

Purifiers are always placed on the inlet to the holder, before the station meter. I have never seen but one exception to this rule, and that was at a water gas works. The superintendent figured that he was making gas faster than he was sending it out. I did not contradict him.

In building a tank for the holder the greatest of care should be taken and an engineer employed to direct its construction, in the interests of the gas company—there is money in it. I have seen several tanks constructed without this supervision that appeared to be excellent in every respect. No money was spared, and cement was used without stint, but when finished they had the bad habit of not retaining the water. These tanks were mostly built on the bank of a stream or river, in gravelly soil, and that good old fashioned custom of puddling behind the walls with clay, well worked, discarded.

After the holder comes the governor. A good governor is one of the best investments that a gas company can make. I declare I believe it is better than an electric light plant on a gas works. In the absence of a governor a bye-pass of, say, 2-inch or 3-inch pipe can be run around the valve; this, with a properly-adapted stop-cock, can be adapted to reduce the day pressure, and so allowed to remain, and the main valve (only) operated every morning and evening. This is better than nothing, but since it is not in the least degree automatic it needs some attention. It may be well to retrace our steps through the works and say that no gas plant should be operated without a proper equipment of pressure gauges and thermometers. To attempt to do without these is to work in the dark; and no one engaged in the praiseworthy calling of furnishing light should do that. A jet photometer is also necessary.

Before taking leave of the works a word on Sunday labor may not be out of place. "The Sabbath was made for man," and it was intended that we should rest from our labors on that day. I am satisfied that a gas works can be operated without making gas on Sunday. I say it *can* be done. Whether it is practicable or not is an open question, and one I would like to see discussed thoroughly in our conventions. Well do I remember a remark of the late Mr. S. S. Ward, for many years President of the Hartford (Conn.) Gas Light Company, who, in speaking on this question, said: "I would rather take less dividend than have the works operated on Sunday." Would there were more like him.

I believe, however, that our friend Harbison continues to shut down the works on Sunday. With respect to Sunday repairs, when the works are run on that day Monday is a better day to make them; for the holders are usually well up on Monday morning, after a light Sunday consumption, whereas the reverse is the case on Sunday.

Brethren! make your repairs on Monday.

(To be continued.)

## Some Notes and Observations on American Gas Making.

By Mr. R. Dempster, Manchester, England.

Those who had the pleasure of meeting Mr. R. Dempster (of the English firm of constructing engineers who played no unimportant part in the work of equipping the magnificent gas plant recently completed in Toronto, Canada), while on his visit to this country in the last half of '88, must acknowledge that his eyes were not closed, and that time did not hang heavily upon him. As one result of his activity and alertness we are now to be regaled with a well-prepared series of papers in which he writes down that which seemed to him worthy of more than passing thought respecting the gas industry of America. The first paper (the London *Journal* was naturally selected by Mr. Dempster) is appended, and the others will follow in due order:

As I had the pleasure, a short time ago, of making a hurried tour through part of Canada and the United States, I took the opportunity of calling upon some of the gas works in the towns through which I passed; and the following notes of what I saw may possibly not be without interest to some of your readers.

I found, in the first place, that the American gas manager has usually double, and often treble, the amount of capital upon which to earn a dividend as compared with an English gas manager. This arises from a number of circumstances. Materials and labor for erecting gas works and laying mains cost about twice as much as they do in England. In a large number of cities competition is, and has been, the rule—two, three, and even four companies competing for the business, either by lowering the price or increasing the illuminating power of the gas supplied. This sort of thing goes on for a time, and then the directors of the different companies find it would be better to amalgamate. After negotiations have been settled the amalgamation takes place, and a "consolidated company" is the result. Thereupon the price of gas is immediately raised to an amount that will pay a dividend upon the total capital invested, although half of it may have been spent uselessly; the result being that the public grumble. It may be asked, "Why is this permitted? Have not the gas companies Acts of Parliament to secure their monopoly?" The answer is, "No; but they get an ordinance from the city authorities to open the streets, supply gas, etc." All goes on well until some patentee or financier, who owns or controls some new patent for making coal or water gas, visits the town, gets the ears of a few members of the Council and explains to them that if he had power to put down his plant he would supply gas at a much lower price than the old company. For a time they do not seem to see it; but after the exercise of a little patience and perseverance these councilors suddenly discover that a great benefit would be conferred on the city by having competition in the supply of gas. Why should they not have it for gas as well as for everything else? The result is that an ordinance is passed. In some cases the financier will then offer his ordinance to the old company, provided that they give him an order, at an unreasonable price, for one of his so-called "patent" plants, in which event he would not build separate works, lay new mains, etc., as the old company could then supply cheap gas by having his apparatus. The company may think this the less of two evils, and buy out their competitor by the purchase of one of his plant, even if only to keep it idle. (I called at one works where this had actually been done.) If the terms are not accepted, the result is competition, which is followed by consolidation; and the consumer finds he has to pay such a high price for his gas as will produce a dividend on the money wasted on two works, two sets of mains, etc. This kind of thing has its influence on shareholders as well, owing to their company not having a complete monopoly; for they fear that they may any day have competition. They therefore prefer to charge a high figure for their gas, in order that they may have large present profits, instead of charging a reasonable price, being satisfied with a just return, and having faith in the concern as a sound investment with a fair dividend-earning capacity for the future. This insecurity has its effect in hampering both engineer and directors in the matter of extensions. If they had a complete monopoly they would launch out boldly when constructing new works and extending their mains, and would make them of ample size to supply the district properly for many years.

The system of management adopted in American gas works appears to be different from that in vogue in English works. The chairman (who is styled the "President") of the concern often undertakes the duties performed here by the engineer. He is expected by his shareholders to be a man who thoroughly understands the manufacture and distribution of gas; and, as a rule, he spends a good deal of time both at the offices and on the works. Very often the engineer is promoted to the position of president, if he should be so fortunate as to be a shareholder, even if only a small one. The salaries of gas managers are about double what they are in England. A good many managers keep their own horse and "buggy," which is absolutely necessary, owing to the extensive area covered by American cities.

The construction of American coal gas works is, in general, like that of English works; but in some points American works differ from ours. The retort benches are charged from the floors; but great numbers have the stage floor arrangement. Different works have their particular retort settings, with all the various forms of gaseous and regenerative furnaces which are in vogue. American managers appear to be feeling their way carefully with regard to gaseous firing, just as their brethren are doing here. They go in for getting a high yield of gas per mouthpiece; and, even where ordinary furnaces are used, 10,000 cubic feet per mouthpiece is quite common. As a rule they employ large retorts, and I do not think they have so many different shapes and sizes as we have. (*En passant*, I would ask, "Why cannot we have a standard shape of ⌓ and oval determined, and then only allow three sizes of retorts from each ⌓, oval, and round to be made?) The flues of the retort benches in most cases come just a few feet above the top of the bench, where they belch out their flames, heat, and smoke. One engineer tried to make me believe that this was better than having chimneys to carry away the products of combustion. I asked him if this plan did not produce a great deal of dirt and smoke in the retort house, and make it disagreeably hot in warm weather; also if it did not affect the ironwork of the roof; and, further, whether the long-continued heat did not make the roof slates brittle, etc. He said it did not; but I am not convinced, and still think it best to take the combustion products outside by means of a chimney or chimneys.

I noticed in my travels quite a number of curiously-shaped hydraulic mains, designed, I suppose, with the object of preventing them from becoming blocked up with pitch. The mains are generally of cast iron in continuous length, and not in separate lengths to each bench of retorts as the English custom has been for some years. The American engineers seem to have a weakness for keeping them close to the top of the retort bed. If they would raise them a couple of feet, so that the heat of the bench did not affect them, the necessity for adopting such curious shapes would, in some measure, be obviated.

The condensers are always placed under cover (as, in my opinion, they should be, whether in America or elsewhere), and are generally of the multitubular class, with small pipes inside an outer cistern, and controlled by means of water. They work fairly well, I believe; but the vessels struck me as being too small for the quantity of gas they are expected to condense, and the Americans have more trouble with naphthaline than we experience. It is true that with this class of condenser the gas on entering encounters the warm water first, and gradually meets the cold water at the outlet; but when the cubical capacity of the condenser is so small that the gas is only from 10 to 30 seconds passing through it, the sudden condensation is liable to produce naphthaline. In connection with this matter I may remark that I am not aware of any experiments having been made, either in this or any other country, with a view to determine what is meant scientifically by the terms "sudden" and "slow" condensation. I observed that a few of Pelouze and Audouin's condensers have been introduced into America.

With regard to scrubbing, I noticed that the Americans do not give so much attention to this department of gas purification as we do on this side of the Atlantic. They treat ammonia more as a nuisance to be got rid of than as a source of profit. One engineer told me they did not care to worry themselves about making 1 cent per 1,000 cubic feet from ammonia, when, by giving attention to other matters, they could save at a strike from 4 to 5 cents per 1,000. I pointed out that even 1 cent per 1,000 feet, when considered at the end of the year, would be an item of some importance. Scrubbers and washers are, however, in use; but I got the impression that they did not know how to use them to the best advantage.

There are very few places where sulphate of ammonia is made. I was told it was exported to England in order to find a market, and yet I find that this country shipped 14,000 tons of sulphate to America last year. I understand that a profitable business is being done by a few companies who buy the ammoniacal liquor from the gas companies (paying them

for it at the rate of about 1s. per ton of coal carbonized), and convert it into aqua amonia, which finds a ready sale for producing anhydrous ammonia for ice making, and for cooling breweries, shops, etc., during the continuance of hot weather.

I only saw two forms of exhausters at work—viz., the Roots, which somewhat resembles the old Jones exhauster, and the Mackenzie.

I think the American gas engineers allow for larger purifiers for their make of gas than is the custom in this country. This may be the result of the irregular production where water gas plants are in use; and no doubt it is also in great measure due to their not using scrubbing appliances to greater advantage. Their purifiers are lightly constructed, however, as compared with our modern English-made ones. This may be owing to the price of iron in America being double that charged in England. The purifier covers have generally flat tops, stiffened outside with T bars. One cannot go into English gas works without noticing the endless variety of designs of appliances for raising the covers of purifiers; whereas in America they seem to have only one, which is, however, a good one. It consists of a double "Goliath," connected together in the form of a square by light girders. The lid is lifted, without any straining, from four points, which are generally at or near the corners. The whole is mounted on large wheels 3 ft. or 3 ft. 6 in. in diameter, so that the friction is light, and the machine can be propelled by simply pushing it. Steam pipes are always laid under the lutes, to prevent them from freezing.

Station meters are all made round, irrespective of size; and to me they appeared to be old fashioned, owing to my being accustomed to seeing square ones. I noticed that some very large meters had been cast in one piece. But the modern practice is more sensible, and they are now being made in segmental plates with planed joints.

With regard to gasholders, at one works I saw a novelty—viz., a single-lift holder, 110 feet in diameter, which was guided by a central pillar 18 inches thick, and the ordinary bottom rollers. The pillar was stayed from columns placed on the side of the tank. This holder had been working satisfactorily for a number of years. Except in the case of small holders, the columns are rarely made of cast iron, but of $\frac{5}{16}$ or $\frac{3}{8}$ inch wrought iron plates. They are jointed with straps placed inside, and riveted flush on the outside. The vertical joint faces toward the holder, and is partly hidden by the guide-rail. When finished and erected, the columns appear to the eye to be formed of one piece. The bottom and top parts are made very strongly of cast iron, with bold ornamental mouldings on. The round column is being departed from, and plated or latticed standards are taking its place in most of the new works. In telescopic holders I found channel iron was almost universally employed for the cups; and I was told that there are at present only two holders in America with bent cupping. While in Chicago, I was privileged to inspect a 3 million cubic feet gasholder which was being erected by Messrs. R. D. Wood & Co., of Philadelphia, who had adopted a novel plan of putting up the columns and girders. The first lengths were erected from the ground; then the hoisting tackle was fixed in a suitable way on the top of the holder. The vessel was next blown up with air, and the second, third, and fourth tiers of columns were lifted from the holder, which was further raised a tier as each tier of columns was erected. On this holder a hand-rail was fixed on each cupping, so that in frosty weather men could walk round safely when clearing ice out of the dips. The constructors had also fixed syphon tubes to run the superfluous water out of the dips into the *inside* of the holder, so that any overflow from the dips would not run down the outside and form ice in frosty weather. In the Northern States gasholders are generally put under cover. Sometimes the holders stand in ornamental brick houses with slated roofs; in others they are protected by a corrugated-iron house supported by the gasholder columns. At one works I found the engineer (who was an Englishman) had constructed a roof over a holder 95 feet in diameter without having tie-rods across the roof. This was accomplished by using a 6-inch angle iron on the top of the brick walls, and constructing the roof like an arch—making the angle iron into a circular tie rod.

During my tour I met with a considerable number of Connelly's automatic governors, with which the engineers using them were well pleased. This appliance puts on and takes off the pressure automatically according to the *volume* of gas passing through it. Having once fixed upon the minimum and maximum pressures at which it is desired to work, it does not require any further attention, except oiling, from one year to another. Owing to its being self-acting, the governor is more likely to put on and take off the pressure at the right moment than any arbitrarily fixed time system. A great deal of unnecessary pressure is thus kept off the mains; leakage being, as a consequence, considerably reduced.

(To be continued.)

(Continued from page 111.)

## Gas Making in England Forty Years Ago.

By Geo. Anderson, C.E.

[The third of a series of articles in course of publication in the *Gas Engineers' Magazine*.]

Although I conducted the Surrey works till 1854, I now look back upon it as the most disagreeable period of my life. The works were originally most inadequate, consumption of gas was extending fast, and I was continually extending and enlarging every part of the apparatus. In one of these years the districting on the south side took place, and £8,000 of additional rental was shoved on to me in a single week. I had to build a range of retorts out in the yard, and worked them for that winter without a roof.

Mr. Methven left the "Central," and in consequence of the breaks-down in the machinery there under the new manager, I was frequently called across from Rotherhithe to Bow to assist in getting them to rights, till at last I stipulated that the moving machinery, engines, exhausters, pumps, etc., should be in my charge and responsibility, when I afterwards paid a visit or two a week. Then Mr. Croll took to having screw colliers to bring our coal in our own vessels; one to carry 700 tons was contracted for in Newcastle and another of 500 tons in Scotland, and I was appointed inspector of both, and had to pay several visits to them during construction. These steam colliers requiring quick dispatch, I designed and erected a steam hoist on a timber jetty run out to the "Walker line" on the Thames; this was the first of its kind in London. Then I put up sulphate of ammonia apparatus to convert our liquor into salts, which was also the first instance in London of a gasworks working up its own liquor, nor did any one follow for many years.

During the year 1854 I designed and brought to a success my tar fire, after experiments made both at Bow and at Rotherhithe. During this year, too, Croll became Sheriff of London, and I saw very little of him except when he came down in his gilded carriage and beautiful lace. I thought him more distant—not so familiar as he had been many years before, when he freely told me many things that were close secrets between us. I came to know him so well that I could tell the condition of his mind by every muscle in his face, or even by the color of it. Probably he saw through me, too, for I did not pay proper respect to the gilding or the lace, and in the autumn of 1854 I determined to resign, and did it. I was disgusted with the locality and the surroundings, and made up my mind that I would not pass another winter in it.

And so we parted—each a little stiff, you know, to each other. When we had settled up he asked what I was going to do. I replied, "Oh, follow in your footsteps if I can, and if I get on as well as you have done, I will have no cause to complain." This said to him meant more between us than it would have done to any one who heard it, his private secretary, George Rait, being present. Having to call on George next day to settle some matters, he told me Mr. Croll wanted to see me. Before we parted he asked me what I would require to conduct the engineering portion of his business, and I gave him an answer which he rejected. Two years before he offered me a partnership in an engineering firm, the partners of which were to be Croll, Anderson, Methven and Rait. Croll was to give his influence, Methven and I were to be the engineers, and Rait was to be the bookkeeper. This proposition I rejected, so I cogitated on what he wanted.

Failing anything acceptable, I thought of asking him to hand me the lease of Winchester Gasworks. He had formerly been engineer for that Company, and I paid visits to Winchester representing him in that capacity. On one of them the directors proposed to me to take a lease of their works as Croll had done at the Great Central. I did not feel disposed to leave Croll, so I replied that I would mention it to Mr. Croll—they thought it would be too small a thing for him, but he accepted it, and I engineered it for him till I left. I had never told him that I had had the first offer, for fear I would wound his pride, but thought I might do so now; however, I had no need to mention it, for what he wanted was of a far more agreeable character, namely, for me to go to Constantinople to report on the lighting, paving, sewage and bringing in an additional supply of water to that city. After a three years' residence in Rotherhithe, overworked as I had been, I just wanted a "pick-me-up," and this of all things possible was the most acceptable, so I closed, and on the 8th November I sailed from the Thames for Turkey in a screw steamer called the *Sardinian*, on her first voyage, with one of her proprietors on board, who would sell her to the highest bidder on the first opportunity.

Screw steamers were "sound nuts" at that period, viz., the time of the Crimean War. Anyone with a serviceable steamer at that time could realize 50 per cent on its cost before the war. Croll had sold both the

steamers I have previously mentioned. The larger one made two or three trips from Newcastle with coal when she was sold, and the smaller one only made her first trip from Scotland to the Thames when she was sold—in fact she was sold before she was finished. He had sent me to Scotland to hurry on her completion and see her make a trial trip. When I arrived the coppersmiths had several days' work to do to connect the steam pipes, and several other things were behind. I got the contractors to put on a relay of men, so that the work proceeded night and day. I was receiving telegrams and letters from him daily, urging completion, which I was replying to as soothingly as I could, for though I knew the impetuosity of his temper, I felt annoyed at his flogging me who, he well knew, had always my neck hard against the collar. At last I resented. We had had the trial trip, and some of the engine bearings heated so we had to return to dock for adjustments. I received a telegram, "Send up the vessel immediately.—Croll." To which I replied, "Send someone to fetch her; I won't send her till she is ready.—Anderson." My "monkey was up," and he knew it, for I had no more telegrams. The delay must have been very annoying to him, as he might have sold to deliver on a day that had passed, and the sale might be off.

My trip to Constantinople was a very pleasant one. We touched and landed first at Gibraltar and next at Malta, having a day at each place, where I made an acquaintance with the fortifications of the former and the churches of the Knights of St. John in the latter, reaching the Golden Horn on the 25th, or seventeen days out from London. I delivered my letters of introduction, and was told that it would be impossible to see any of the Ministers for some days; the Porte was so much taken up with the war that nothing else would be attended to, so I spent my time in the city, its streets, bazaars and churches, boating on the beautiful Bosphorus, and riding out into the country to study the water question. I also made a short voyage up the Black Sea to a coal field which was being worked for our steamers, and brought a sack of it away to test it for gas making, and continued by the same steamer on to Balaclava, to see a bit of the war; thence I went "to the front" and camped for three days in a tent with three soldiers. The war at the moment was stopped, the Russians some days before had made their famous retreat to the other side of Sebastopol harbor; so I could wander where all the battles had been till I mounted the Redan or the Malakoff, to either of which the soldiers told me the Russians sent a shot when they saw anything move.

On my return to Constantinople, the war was still the only subject that could be attended to by the Porte, so after completing my observations I left notes of conditions to be submitted, and returned to England *via* Marseilles, Paris, etc, made my report and finished with Mr. Croll, to commence on my own account. I had patented my exhauster the year before, and had sold several at a good profit. I entered into a contract with the Dover Gas Company to relieve them of the nuisance of their liquor passing into the sea, by which I converted it into salts, receiving the liquor free, and putting up apparatus at my own expense on the works to purify the gas from ammonia, and to convert the liquor into salts. This year I patented improvements in retort settings, including my tar fire, and took a contract to erect six settings of these at Dover, and also designed my four-way valve; and, before the year was out, had arranged with the Dover Gas Company to take a lease of their works, in partnership with Mr. Jones, their then secretary.

My first year on my own account was far more profitable than any previous one while I was a salaried official. There was a little episode connected with the leasing of the Dover works that is worth relating. The Company had been paying an average 5 per cent. dividend. I knew that I could manufacture gas cheaper than they did, and we made an offer of an annual rent which would place them in a better position. The Company referred the matter to the late T. G. Barlow, then proprietor and editor of the *Journal of Gas Lighting*, who reported that our offer should be considerably increased. Now, if we had not made any offer, and Mr. Barlow had first made his report, I would have accepted and agreed to the higher rent. The question was how to make some compromise that would satisfy him without appearing too inconsistent.

Thinking the matter over, I remembered that during the Great Central agitation Mr. Barlow had written a pamphlet in defense of the gas companies, proving that gas could not be produced in London at less than 6s., the then price, while earning a 10 per cent. dividend to the shareholders, and addressed to the Earl of Carlisle by a "Civil Engineer." This pamphlet had been distributed over the country, and I think it was also published over his own name as the author. It was a clever pamphlet, giving in detail the cost of all items that go to make up the cost of gas, and to those who did not know was well calculated to convince and frighten capitalists from taking shares in the Great Central, who proposed to sell at 4s.

I took this pamphlet in my pocket, and calling on Mr. Barlow, said I was sorry he thought our offer too low, and producing the pamphlet, said, "Now here is a pamphlet which goes into the subject in a very able manner." Mr. Barlow knew the thing as soon as he saw it in my hand. "Now," I said, "Dover being a small place, I had hoped," etc. He seemed a bit in a dilemma, so I kept on mildly remonstrating, and hoping to give him time. At last he said, "Ah—yes—I see—hem—I see your offer includes the supply up to the consumers' meters. I reckoned the cost into the holders—and as you have to bear the leakage, your offer is better than I reckoned it." I saw the business was settled. Mr. Barlow maintained his consistency—I maintained mine. "I was so glad I had called on him—would have been so sorry had the difference not been cleared up," etc.; so he confirmed our offer, which secretly was the point on which I was most glad. The Company required security, so I bought its shares at par, and lodged them rather than ask any one to be my guarantor, and lucky for me I did, for in a week after I had paid for those shares my banker failed and locked up all my ready cash. Several parties owed me money at the time for exhausters and retorts, so I had an excellent excuse for pressing payment—to several parties I owed money for goods, and they were kind enough not to press me, but for several months I was tolerably "hard up."

Our connection with the Dover gas lasted for 21 years. When we went the consumption was 33 millions per annum; when we left it was 100, with but little increase in building, but with a constant supply of well purified gas. Our career at Dover was one uninterrupted success, both for us and for the Company—unless in one instance, to which I will presently refer. When we began I bought shares at par—long before we finished they were not to be had under 50 per cent. increase. They were without Parliamentary powers, and the Local Board continually had their knife in them, although they supplied to the public lamps at 1s. 6d. per 1,000 cubic feet, though the price to private consumers was as high as 6s. 8d. All this was altered by a bill in Parliament, the price of gas was reduced to the private and increased to the public consumer, and at the termination of our lease the directors gave us a farewell dinner. The unfortunate instance to which I have referred was the coal famine which raised the price of coal from two to three times its usual cost. As we had contracted to manufacture the gas at a fixed sum per 1,000 cubic feet, this increase in the cost of coal meant ruin to us. The price of gas was being raised all over England—we applied to the directors to grant us some compensation, and to raise the price to the consumers, as was being done elsewhere. The directors applied to their Engineer, Mr. Kirkham, then resident Engineer of the Imperial Company's works at Fulham, London. He advised the Board that we were not entitled to any increase, stating, as he did to ourselves, that his Company were doing better than before the price of coal increased, because they got so much more for the residuals. I suppose, however, he did not tell our directors that his Company, up to that moment, were ruining their contractor by insisting on his carrying out his contract to supply at the old price, and perhaps he did not know that his Company, within a few months, would raise the price of gas to the consumer, as they did, 9d. per 1,000, if my recollection is correct. I took the deed under the provisions of which we conducted the works and studied it carefully, and discovered a clause out of which I thought we could procure relief. We were required to give a certain pressure of gas by night and another pressure by day. The consumption of gas had increased to double what it was when we took over the works, and this increase we had given chiefly by working at an increased pressure, thereby saving the Company from the cost of increasing the main pipes. I drew Mr. Jones' attention to the clause. I advised that the pressures be reduced to those stipulated for in the deed, that a circular be sent to each consumer setting out the history of the change, advising them to burn as little gas as possible, and if they had any complaints to make of want of gas to send them to the Company and not to the works as heretofore. The first night of the reduced pressure the town was in semi-darkness, but that day the consumers had received the circular, and knew it was the fault of the Company, and not of their contractors, Messrs. Anderson and Jones. You may depend upon it the next day, and every day while it lasted, the secretary and the directors had a lively time. Mr. Kirkham was sent for—he fixed a pressure register, hoping, I suppose, to "catch us napping," but we kept a tenth more on than the deed stipulated, knowing that that was still some 30 per cent. less than was required.

After a few nights of "this medicine," it had operated on the whole town; the cry was, "give us gas, we cannot see to do our business; you must be a mean lot to expect Anderson and Jones to give gas at the same price as when coal was half the cost it now is." The chairman of the

Company was a coal merchant in the town in a large way, his common sense would tell him that they were trying to establish a lie as truth—we were sent for, our request was granted, and up went the pressure. It came out afterwards that there was a desire to break our lease. The Company were selling gas below the maximum stated in their Act, so that there was no need to apply for power to increase the price, as had to be done by many gas companies at that crisis, Mr. Kirkham's Imperial Company included. However, I suppose it was only human nature. Likely the directors were informed that we had "a very good thing" of it, all parties concerned would have their "screw" augmented, if the works fell into their hands—and as it did not turn out very disastrous to us, I suppose we must forgive them, merely making a note of the incident.

In 1856, while conducting the Dover Works, an agitation arose in Cork for cheaper gas. The agitators had got a hold of some of the Great Central agitating literature, for Croll's name and his prices were quoted. The Cork City Solicitor came over to London and called on Mr. Croll. Mr. Croll referred him to me, and I visited Cork to advise the Corporation as to the price of gas. Gas was then supplied to Cork by an English company who had works in Dublin, Limerick and other places. The price in Cork was 6s. 8d. per 1,000 cubic feet. I had to rid their minds effectually of the applicability of Col. Croll's London figures to Cork, where the annual demand for gas was only 50 million feet. In my report I advised that the price of gas should be reduced to 5s. per 1,000 cubic feet, with a reduction of 3d. per 1,000 cubic feet on every increase of 25 million annual consumption until the price arrived at 4s. 3d., and by way of a counterblast to a cry I found of building new works, a concluding paragraph of my report was as follows: "Competition in the supply of gas is only to be resorted to as a *dernier resort* when gas companies fail to divide with their consumers those profits which arise from the development of science and increase of their business." A proposition in the sense of my report was made by the Corporation to the gas company and rejected by the latter; after which a local company was formed and I was appointed engineer, which position I have held till the present time. We commenced operations in 1857 and applied to Parliament for a Bill, in which we were opposed by the existing company, and beaten. By this time the retort-house was built and the gas tank in hand. A meeting of the shareholders was called and held in the retort-house. At that meeting it was decided to go on as a limited company. Of course I made a speech in the sense of going on; and I doubled my holding in the Company's shares; several others did the same, and we never relaxed our efforts for a moment. I had taken a hint from the Great Central agitation, and got 1,500 consumers pledged to burn the new Company's gas at 4s. 6d. per 1,000 cubic feet. The late John Francis Maguire, M.P., was our chairman, an excellent speaker and very popular in the city, also proprietor of the Cork *Examiner*, whose pages were open to us, and I must say, for Irishmen, that they exhibited more practical sense in sticking to the new Company than did the Londoners a few years before *in re* the Great Central.

[To be continued.]

## SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, FEB. 9, 1889.

*Condition of the Gas Industry.—An Extraordinary "Accident."—Financial Confidence in Gas Lighting.*

The Parliamentary returns for the year ended Dec. 31, 1887, have only just been issued, by which it will be seen that in this respect the Board of Trade have not been free from the "circumlocution with which the conduct of Government affairs is popularly credited. The Gas Light and Coke Company and the South Metropolitan Gas Company have also issued their reports and statements of accounts for the year ended Dec. 31, 1888, and are just a year in advance of the Government. It is not my intention at present to remark upon the difference thus indicated between the procedure in respect to public affairs as compared with that usual in private undertakings; the three incidents of the publication of Government returns, the accounts of the Gas Light and Coke Company, and the accounts of the South Metropolitan Gas Company are merely referred to in juxtaposition, because these documents, taken together, furnish useful information as to the progress of our industry. Statistics from the Government report represent incontrovertible facts; and those of the London Gas Companies are no less reliable, and at the same time represent the state of affairs in a city where, of all parts of the country, the most active endeavors have been made in the way of introducing electric light, cheap petroleum, and all other systems, practical or otherwise, of producing artificial light. An enthusiast on the subject of oil lighting, who believes that mineral oil (burnt in a lamp invented and manufactured by himself) is to be the light of the future, recently stated that "gas had reached its zenith and was now going down hill;" but we shall find that the actual facts do not support this assertion.

Taking the Government return first, it appears, as compared with the previous year, that the amount of capital invested in gas undertakings has been increased to the extent of some 5½ millions of dollars; more than 300,000 additional tons of coal have been carbonized, producing an increased yield of gas to the extent of some 3,500 millions cubic feet. The sale of gas has increased 3,000 millions cubic feet, 670 miles of new mains have been laid, and nearly 33,000 new customers have been added to the register of the undertakings, not including nearly 10,000 new public lamps. The proportion of paid up capital per ton of coal carbonized is about $26, and the revenue expenditure per ton of coal carbonized is $5.50. The average profit earned during the year, as shown by the difference between receipts and expenditure is 8.8 per cent. in the case of the companies, and 6.6 per cent. in the gas works belonging to local authorities. The average consumption per consumer is 45,000 cubic feet per annum to the Companies, but not much more than half that quantity in the works belonging to local authorities. The returns deal with 384 companies, having an average paid up capital of 37 millions sterling, and with 168 local authorities, having a total capital of 20 millions sterling.

The reason of the rate of profit being less in the case of the local authorities, is that several undertakings are prohibited from making any profit at all. They sell gas at cost price. In other cases this rule is not followed, as at Manchester, where the gas works yielded nearly $250,000 profit; at Salford, $188,000 profit; at Birmingham, $130,000 profit; at Nottingham, $120,000, etc. The lowest price charged by the companies is that at Plymouth, which is 42 cents per 1,000 cu. ft., and yields a profit of 12½ per cent.; and the lowest rate amongst the corporation gas works is that at Leeds, which is 44 cents, subject to discounts of 2½, or 5 per cent. This charge, however, has resulted in a considerable loss. The majority of the companies are limited in the matter of dividend to not more than 10 per cent. on old and 7 per cent. on new capital per annum. About 40, however, are subject to the operations of the sliding scale, and are thus able to pay higher rates of dividend, the maximum being 16¼ per cent. It is necessary to explain that these rates are simply nominal. For many years past all new capital has been raised under the auction clauses. It is put up for sale at public auction, and of course realizes a great deal more than its nominal value. £100 worth of 7 per cent. stock would realize £140 to £150, and 10 per cent. stock would realize more than double its nominal value. By virtue of the auction clauses the difference between the nominal value and the actual price paid is passed into capital account as "capital not entitled to interest." The high rates of interest above alluded to are therefore utterly illusive and liable to mislead outsiders, and to give an impression that gas shareholders actually receive 10 per cent. or more on the money invested. But it is simply a farce when a man draws £10 per annum interest on £100 nominal stock, for which, however, he has actually had to pay about £220, to tell him that he is getting 10 per cent. interest on his money. The highest price charged for gas is $1.80, and that is at the new established undertaking for Walton-on-the-Naze.

The Gas Light and Coke Company have earned, during the second half of 1888, an amount of profit sufficient to pay the maximum dividends to which they are entitled, and to leave a balance of $135,000 over and above. It will be remembered that a reduction of 6 cents per 1,000 cubic feet was made at the commencement of 1888, and that a similar reduction was announced at the commencement of the current year. Part of the increased profit is due to improved prices obtainable for residuals; but there has also been an increase of 3 per cent. in the quantity of gas sold. The former cause represents a saving of about 2d., and the increase of business nearly as much, on the cost of the gas to the Company; so it will be seen that the reduced price is more than compensated for. Another satisfactory item is an increase in the receipts for meter and stove rents, which not only assists the accounts at present, but also gives a promise for the future. Both the London gas companies complain of greater strictness on the part of the Gas Examiners, which has necessitated in each case an unusually large consumption of cannel. This is not altogether an unmixed evil. In these days of brilliant electric lighting people are apt to talk of "yellow and dingy gas;" and it is more than ever necessary to be careful about keeping up the quality. If they have been forced to improve a little in this respect, consumers will not fail to appreciate it. The fact that in past years the consumption of cannel has been much lower in the case of the London companies than is found necessary in provincial works, where a gas of nominally

similar quality is manufactured, has been freely commented upon; and it has been remarked that there are no special processes of purification available in London that are not also applicable in the country. Especially in the face of fairly prosperous times, there is no reason to be parsimonious in respect to the cannel heap. There is some similarity here with the effect of the sulphur clauses, which, though little short of ridiculous in a direct sense, by a sort of side wind render it necessary for the gas to be completely freed from carbonic acid, by which it is rendered more acceptable to the consumers in several respects. The experiences of the South Metropolitan, as set forth by the statement of accounts, have been similar to those of their big neighbor—a satisfactory increase in the sale of gas, and better prices for residuals. As an earnest of the intention on the part of the directors to continue their policy of sharing their prosperity with the consumers, they announce a reduction, dating from the commencement of the present year, of 4 cents per 1,000 cubic feet, which will bring the present price to 54 cents per 1,000 cubic feet.

I have often heard my father, when hobnobbing with brother chips, who, like himself, had been identified with the gas industry from the period usually spoken of as "its infancy," talk of the times when it was necessary to go round and warn the consumers that "there would be no gas to-night." But such an occurrence is supposed to have been guarded against and rendered all but impossible for many years past. Perhaps on account of some unusual accident or derangement the stock of gas may be completely exhausted at an early period in the evening; but then there is the regular make, supplemented by liberal doses of cannel, which can be delivered straight into the mains. To read of a total cessation of gas supply, for a period of two hours on a Saturday evening, carries me back to the early times above mentioned. Yet such was the experience at an important Derbyshire town, at a period of time no more remote than last Saturday night. It is difficult, from the meager details at hand, to say how far this was to be regarded as an accident, and to what extent chance or negligence, respectively, are entitled to blame for the catastrophe. A portion of the purifying plant at the works in question consists of four purifiers, "almost worn out," and a "very old center-valve of the hydraulic type that is constantly losing its seal." The decrepit center-valve, it appears, developed a condition of rapid decay in its inward parts, and suddenly failed to deliver gas to the outlet, diverting it into a vessel that was standing off for cleaning. Not only was the whole of the make blown to waste in this manner, but also an ample stock from the two holders was lost by returning back through the inlet to the center-valve. Why this should have been allowed to take place is not very obvious. The best plan would have been to have shut the inlet valves and thus saved the contents of the holders, which are alleged to have been ample for the evening's requirements. Sufficient time would thus be gained to admit of some temporary arrangement being made. It is easy, however, to be wise after the event. The manager of the works is in no way to blame, having repeatedly pointed out the necessity for replacing the existing apparatus; and his directors will probably give more heed to his representations in the future.

Certain unpleasant chapters in my own experience have accentuated the desirability of guarding, as far as possible, against accidents due to the failure or disarrangement of valves in the purifier house. Where all depends upon a single center valve, whether hydraulic or dry-face, the difficulty of dealing with any defect is great. If the valve takes to leaking, and passing foul gas direct from inlet to outlet, 24 or 36 hours' stopping are perhaps required in order to remedy the defect. A nice predicament in the dead of winter, with perhaps only 70 per cent. holder. The best plan is to divide the purifiers into two groups, either of which can be worked independently of the other, or both together. Two four-way valves of simple construction will accomplish this, and the only cause that can necessitate a total stoppage is an accident to one of these two valves. As they can be repaired or replaced by a temporary connection, if necessary, in a few hours, the gas engineer who is thus accoutered will enjoy an immunity from risk of accident such as the above, that the single center valve man, especially if he can boast "a very old one of the hydraulic type," is a stranger to.

A glance at the latest transactions on the stock exchange is sufficient to illustrate the public confidence in the future of gas lighting. Shares in the London Gas Companies, bearing 10 per cent. dividends, realize more than 2½ times their nominal value; and it is noticeable that shares entitled to higher dividends under the sliding scale, do not carry a proportionately higher value. Indeed there is only one instance where shares under sliding scale regulations appear to be valued at a higher rate than sound 10 per cent. stock, and that is the A stock of the South Metropolitan Gas Company, which is quoted at more than three times its nominal value. Good debenture stock in well managed gas companies will realize prices that leave not more than 3½ per cent. on the actual amount invested. For example, 4½ per cent. debenture stock in the Commercial Gas Company has been quoted at £125 per £100, and 4 per cent. debenture stock in the Gas Light and Coke Company has been sold at more than £120 per £100. Indeed it would be possible to quote several classes of gas securities that are not yielding to their owners so much as 3½ per cent. per annum. Even in small country districts shares in the local gas undertakings realize prices nearly as good. I have known spirited opposition to take place at auction sales for 10 per cent. gas shares, even when the price asked is considerably above double the nominal value.

## Coal in California.

The following statistics respecting the production, etc., of coal in California, for the year 1887, are furnished by Prof. Charles A. Ashburner

Total production, 50,000 short tons; spot value, $150,000.

Although repeated claims are made for the existence of coal beds of commercial importance throughout California, no mines, with the exception of those in Amador, Contra Costa, Fresno, Alameda, and Los Angeles counties, have been worked on a commercial scale. The most important mines have been those in the Mount Diablo coal field, in Contra Costa county, east of San Francisco bay. The most productive bed in this field has been the Clark bed, which ranges in thickness from 2 ft. to 4 ft. 6 in.; this bed has been more extensively mined by the Black Diamond Coal Company than any other bed. A second coal bed known as the Black Diamond has a thickness of 3 ft. 6 in.; this bed was also mined by the Black Diamond Coal Co. from the "750-ft." shaft. The mines of this company ware abandoned in the early part of 1885, on account of it being found unprofitable to compete with the better coals brought into the San Francisco market from Washington Territory and British Columbian fields. It is of interest to note the production of the Black Diamond Coal Co. from 1871 to the time when they were closed in 1885:

*Production of the Black Diamond Coal Co.'s Mines, California.*

| | | | |
|---|---|---|---|
| 1877 | 75,094 short tons. | 1882 | 61,722 short tons. |
| 1878 | 63,573 " | 1883 | 55,965 " |
| 1879 | 71,451 " | 1884 | 52,529 " |
| 1880 | 80,130 " | 1885 | 6,262 " |
| 1881 | 60,173 " | | |
| Total | | | 526,699 short tons. |

This company has been the largest single producer of coal in the Mount Diablo field. Mr. Charles G. Yale, editor of the *Mining and Scientific Press*, reports that the mines of Contra Costa county during 1887 produced about 60,000 tons. From returns made to the survey the production was only 27,600 tons, 20,100 tons for the Somerville mines, and 7,500 tons for the mines more immediately in the vicinity of Mount Diablo. This coal was not sent to San Francisco, but was consumed almost entirely by the river boats.

In Iona valley, in Amador county, several small mines have been opened to supply coal to the Southern Pacific Company; the production of these mines during the year was about 15,500 tons.

At Livermore, in Alameda county, three distinct beds of coal are reported to have been opened by the Livermore Coal Company; these are known as the Summit, Richards, and Eureka beds, having thicknesses, respectively, of 4, 6, and 8 feet. The Richards bed has been worked to a depth of 120 feet, and the Eureka to a depth of 60 feet. The mines produced about 3,000 tons, which were sold in small lots at Livermore, San Jose, Stockton, Oakland, and Santa Clara.

The following are two analyses of these coals reported by Professor Price:

*Analyses of Coal from Livermore, California.*

| | Summit Bed. | Richards Bed. |
|---|---|---|
| Water | 18.08 per cent. | 20.78 per cent. |
| Volatile matter | 39.30 " | 31.00 " |
| Fixed carbon | 35.61 " | 42.46 " |
| Ash | 7.01 " | 5.70 " |
| Total | 100.00 per cent. | 100.00 per cent. |

Several coal beds have been opened in Fresno county, chiefly by the Southern Pacific Company. A small amount of coal was produced during the year.

In Mendocino county a coal bed 14 to 15 feet in thickness has been found. This coal seems to be of good quality, being, in fact, rather better than that from the Mount Diablo mines. The distance of this coal bed from the market and its almost inaccessible position in the mountains render it very unlikely that it will be worked to any extent for some time at least. In Shasta county a thick bed of mixed coal and slate has been found, the total thickness of which is 12 feet; the coal and slate occur in thin seams, almost impossible to separate from each other; this coal was opened but never worked to any considerable extent. At several other places, as in the Sacramento Valley in Placer county, at the

American canon in Solano county, in the hills east of Santa Rosa valley in Sonoma county, and at several places in the vicinity of the exploited areas at Mount Diablo, coal beds have been reported, but probably not of commercial value.

During the past year coal has been discovered in a number of places in southern California, but no coal of any great value has been found. Coal is being worked to a small extent in San Diego county, the coal bed being reported 6 feet thick. This coal is all consumed in the vicinity of the mines. These coal deposits are at Elsinore, and are the first in this county from which coal has been shipped to market. Analyses of this coal are given in the table below. None of these southern California coals will make coke.

The following analyses of southern California coals are compiled from the report of the State mineralogist for 1887:

*Analyses of Southern California Coals.*

| Coals Analyzed. | Water. | Volatile Matter. | Fixed Carbon. | Ash. | Sulphur. | Analyst. |
|---|---|---|---|---|---|---|
| Dolbeer & Hoff, bituminous shale... | 2.65 | 44.25 | 7.40 | 45.70 | 3.43 | T. Price, 1887. |
| Dolbeer & Hoff, coal | 17.50 | 41.00 | 28.65 | 12.85 | 5.60 | do |
| Cheney mine coal | 19.00 | 46.50 | 21.90 | 12.60 | .... | W.D.Johnston, '87. |
| Coal, section 14, township 22, south, range 13 east | 4.10 | 43.40 | 40.25 | 12.25 | .... | do |
| Robinson & Rawlins | 15.50 | 40.00 | 29.50 | 15.00 | .... | do |
| Dolbeer & Hoff, near Elsinore, poorest | 9.00 | 38.50 | 19.25 | 34.25 | .... | do |
| Dolbeer & Hoff, best coal | 15.40 | 43.60 | 27.90 | 13.10 | .... | do |
| Dolbeer & Hoff, face of gangway | 16.25 | 43.75 | 28.15 | 11 85 | .... | do |

None of the coals of California are of as good quality as those of Oregon and Washington Territory, or the foreign coals with which these California coals come in competition in the San Francisco market. A comparison of the relative values of these different coals for steam purposes may be found in the following table, which is taken from the report of Mr. W. A. Goodyear, published in the report of the State Mineralogist of California for 1887:

*Relative Values of Different Coals for Steam.*

| Kinds of Coal. | Value. | Remarks. |
|---|---|---|
| Mount Diablo | 1.000 | |
| Seattle | 1.171 | Experiments at Spring Valley water works. |
| Sydney | 1.503 | do |
| Welsh | 1.472 | do |
| Bellingham Bay | 1.148 | do |
| Nanaimo | 1.277 | do |
| Anthracite | 1.546 | do |
| Wellington | 1.407 | do |
| Nanaimo | 1.335 | Experiments at Garratt's foundry. |
| Wellington | 1.295 | do |
| Seattle | 1.177 | Experiments on ferry boat. |
| Seattle | 1.330 | Probable result of tests on Central Pacific Railroad. |

In these tests the Mount Diablo coal has been assumed as unity.

The following table, compiled from the report of Mr. I. Steuart, of San Francisco, shows the total receipts of coal at San Francisco, San Pedro, and San Diego, California, for 1887:

*Receipts of Coal at San Francisco, San Pedro, and San Diego*, 1887.

| | |
|---|---|
| Australian | 156,729 |
| English and Welsh | 94,028 |
| Scotch | 12,108 |
| Eastern anthracite and Cumberland | 21,709 |
| British Columbia | 252,810 |
| Seattle, Franklin, Green river, Cedar river, Washington Ter | 292,179 |
| Carbon Hill, Washington Territory | 181,267 |
| South Prairie, Washington Territory | 48,163 |
| Coos Bay, Oregon, and Mount Diablo, California | 96,000 |
| Total at San Francisco | 1,154,993 |
| British Columbia and other foreign | 138,000 |
| Washington Territory | 10,000 |
| Total at San Pedro | 148,000 |
| British Columbia and other foreign | 50,099 |
| Washington Territory | 6,000 |
| Total at San Diego | 56,099 |
| Total California | 1,359,092 |

The average prices of the various coals received at San Francisco in 1887 were generally higher than those for 1886; these prices varied greatly from January to December, being highest at the end of the year. This was largely owing to the fact that there was a scarcity of coal in California towards the end of the year. These prices, with their variations from month to month, are shown in the following table:

*Prices of Foreign Coals in San Francisco in* 1887.

| Month. | Australian. | English Steam. | Scotch Splint. | West Hartley. |
|---|---|---|---|---|
| January | $6.25 | $6.00 | $6.50 | $7.00 |
| February | 6.12 | 6.00 | 6.50 | 7.00 |
| March | 6.25 | 6.00 | 6.50 | 7.00 |
| April | 6.70 | 6.50 | 6.70 | 7.00 |
| May | 6.90 | 6.70 | 6.80 | 7.00 |
| June | 7.25 | 7.00 | 7.20 | 7.30 |
| July | 7.50 | 7.25 | 7.25 | 7.37 |
| August | 7.70 | 7.50 | 7.55 | 7.75 |
| September | 7.87 | 7 87 | 7.87 | 8.25 |
| October | 8.00 | 8.00 | 8.30 | 8.50 |
| November | 8.00 | 8.00 | 8.50 | 8.50 |
| December | 9.00 | 9.00 | 9.50 | 9.50 |

## ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

SOME time since the San Francisco authorities determined that it would be a good idea to have a new gas inspector, and a Mr. Brown, having found favor with the politicians, was voted into the office. The incumbent, in order to show an earnest regard for his employers, determined to catch the gas companies napping in the instance of candle power (the standard in San Francisco is 16 candles), and thereupon confronted his photometric equipment. He could not tell whether or not the apparatus was (as he himself subsequently explained at a meeting of the Lighting Committee, Board of Supervisors) correct, and called in Prof. Price to "prove" the apparatus. The Professor having reported that the standard was all right, Inspector Brown made the necessary determination on the lighting value of samples of the gas supplied by the San Francisco Company, and that of the Pacific Gas Improvement Company as well. He found the first to be equal to 15.3 candles, and reported the latter at 15.6 candles. Armed with the resultant figures he approached his employers in a spirit of rectitude, tinctured with gravity and flavored with resolve. Having spread the facts before them they, in turn, notified the supposed delinquents to appear for judgment. President Crockett, for the San Francisco Company, and Supt. Muller, for the Pacific folks, responded. When they got through with a cross-examination of the Inspector the latter finally admitted that he "was not in a position to be positively sure that his apparatus was in a condition to make the correct test," but suggested that as the gas which he examined was taken from a point some two miles distant from where it had been manufactured, he (the Inspector) thought that might account for the discrepancy betwixt the city test and those made on the works on the same day. Now, as the gas at the Frisco works on the day in question, as proved by one of the most perfect sets of photometric apparatus on the Pacific coast—as perfect as any other in the country for that matter—showed a lighting value of 19.18 candles, that of the Pacific Company having a value of 20+candles, we submit that either Inspector Brown got mixed, or that the glorious climate of California is responsible for the discrepancy. The Lighting Committee finally decided that "tests be made by Inspector Brown and President Crockett at about the same time with their respective instruments, provided the examinations be made separately and at different locations." We hope to have forwarded us the result of this trial, and in the meantime would like to remark that President Crockett is not the sort of man who takes pride out of deluding himself.

AT the annual meeting of the Portsmouth (N. H.) Gas Light Company the following officers were chosen: Directors, John Sise, M. Eldredge, W. W. Cotton, Ed. S. Fay, H. W. W. Jackson; President, John Sise; Frank J. Philbrick, Clerk and Treasurer. Another step taken during the session was the appointment of a committee to consider the choice of a Superintendent, the same body to report a plan for grading the salaries of the officers, etc. The Company was exceptionally prosperous during the year.

WE understand that the Glens Falls (N. Y.) Gas Light Company is meeting with very fair success in operating its electric annex.

IT is predicted that the new coal gas plant for the Penn Yan (N. Y.) Gas Light Company will be in operation by the 1st prox. In any event the contractors are as busy as beavers on it.

THE Committee on private corporations, Michigan House of Representatives, is considering a measure introduced by Representative Connor which authorizes the gas companies of the State to "produce, furnish and sell electricity and electrical light." It amends the present act for the incorporation of gas light companies by empowering such companies to furnish light and power by electrical currents within the districts now supplied by them with gas. After an informal discussion of the proposed grant the Committee decided to send printed copies of the measure to the corporation authorities throughout Michigan, with a view to obtaining their opinions on the advisability of so framing the measure as to grant gas companies the right to exclusively supply electricity within their respective districts.

THE Omaha (Neb.) Council still keeps up its hunt after the local gas suppliers. The latest ordinance provides that "the gas manufactured and known as water gas, hereafter supplied and furnished through pipes laid in the public streets of the city of Omaha, shall be furnished at not exceeding the following prices, to wit: For gas equal to 16-candle power, per 1,000 cu. ft., $1, provided, however, that if such gas shall

not be equal to 16-candle power the price thereof shall be correspondingly reduced, and provided further, that upon the failure, refusal, or neglect of any person, company, or corporation to pay any just gas bill within ten days after presentation thereof, the company or corporation furnishing such gas, according to the provisions hereof, shall be authorized in such cases to charge $1.25 per 1,000 feet of gas equal to 16-candle power, or of less than 16-candle power at a corresponding reduction." This ordinance, however, may yet be regarded as unfinished legislation.

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SECRETARY MURDOCK informs us that from and after Mar. 1 the net price of gas for fuel distributed by the Elkhart (Ind.) Gas Light and Coke Company is to rule at $1.50 per 1,000 cu. ft.—a reduction of 25 cents per thousand. This is an evidence of the Company's desire to call on our advertisers in the near future for plans and estimates for considerable additions to its plant. It might be further said that the plan followed by the Elkhart Company is to increase the discount rate for prompt payment, keeping the gross rate at the old figure. Thus—the gross rate is adjusted at $2.50 per thousand, payment within 12 days entitling the user of gas for fuel to a 40 per cent. rebate, while the ordinary consumer secures but a 20 per cent. concession.

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CHICAGO is at the gas question again; and, of course, it is an Alderman who is at the bottom of the agitation. Whelan is the latest worthy's name, and he asks for the appointment of a Board of Gas Inspectors, who shall be required to make a quarterly inspection and test of all gas meters that shall have been shown to have registered, in any one month, a quantity of gas the value of which was returned at $1.50 or over. Having delivered himself safely of this astounding proposition, the Alderman also asked the passage of an order calling for an opinion from the law department respecting the legal right of the gas companies to require a deposit from those who wish to install a meter on their premises. His first proposition was referred to the Committee on Gas; the second was adopted.

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THE Utica (N. Y.) *Herald* says that a train of Wagner palace cars is to be put on the N. Y. Central Railroad, and that a determined effort is to be made to light them successfully with ordinary illuminating gas. Each car is to carry a 9 ft. 6 in. cylinder, in which the gas is to be stored at a high pressure. If the experiment is successful (it is proposed to take the gas on at Syracuse for the run east or west between Chicago and New York) the system will be adopted on all the Vanderbilt lines, to the complete exclusion of oil.

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ONEONTA, N. Y., has succeeded in bargaining for a continuation of her public arc lighting on the basis of $110 per lamp, the same to be kept burning for 25 nights of the month. This is a reduction of $17.75 per arc on the former rates.

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WE are in receipt of the following letter from the Superintendent of a gas works located in a thriving Pennsylvania city, and as it carries its own explanation we submit the same without comment: "To the Editor AMERICAN GAS LIGHT JOURNAL:—In your issue of February 18th you speak of the real meat in Mr. C. H. Nettleton's circular letter in a way that will be indorsed by every practical gas man; but there is also another way in which many gas companies pursue the teapot policy. Why do not the companies furnish to their superintendents or managers the best gas literature of the day, instead of allowing them to subscribe for these, at their own expense, out of their meager salaries? I think that every gas company—no matter how small it may be—should have a library of the best works on the subject that can be had. Each year's proceedings of the different Associations should be published in book form, and a copy thereof should be placed on the library shelves. If every gas company would become a subscriber to such a work, it would no doubt pay some one to compile and publish it. Yours, etc., D."

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THE electric plant now being installed by the proprietors of the Chico (Cal.) Gas and Electric Light Company will be ready for operation by March 1st. We understand that the opposition electric lighting venture in this town is controlled by Anthony Bros.

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THE proprietors of the Millers River Gas Company (Athol, Mass.) have decided to operate an electric lighting plant under the permission recently granted them in this regard by the Board of Gas Commissioners.

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THE Cambridge (Mass.) Gas Light Company has made an order to the effect that hereafter, when a fire occurs within the town limits, one of its employees, conversant with the location of the gas mains and the direction of the gas services, shall be present. There is no doubt that this order had its inception right after the fire which occurred in the old Cambridge Baptist church, the escaping gas from a 2-inch service pipe having in reality added fuel to the flames.

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MERIDEN (Conn.) residents were decidedly anxious to have incandescent electric lamps, and their clamor (for the time, at least) was appeased by a promise that the necessary arrangements for such supply would be undertaken forthwith. The agreement on the part of the suppliers was carried out, but as soon as the schedule of prices was published the shrieking again resounded. The schedule is appended—single lights being the basis: 16-candle power, per month, $1.20; 18 candle power, $1.25; 30-candle power, $1.75; 45-candle power, $2.50. In case 10 lights or over are used, the consumer receives a discount of 5 per cent. These seem sufficiently low.

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THE annual meeting of the Westinghouse Electric Company, which was to have been held in Pittsburgh on February 12th, was postponed for 60 days. The proprietors desire time to catalogue their latest purchases.

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THE bill creating the office of an inspector of gas meters for the cities of Jersey City and Newark (N. J.), presented by Mr. O'Neill, looks to have a good chance of becoming a law. The incumbents are to hold office for five years, are to be appointed by the Governor, and their salaries are provided for by means of a tax levied on the capital stock of the gas companies in the cities named.

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SOME time ago we noted the sale to Mr. W. L. Dresser of the Lee (Mass.) Gas Works. It was thought by some that Dresser was merely an agent for other parties, and this turns out to be the case; for he has turned the property over to the Thomson-Houston Electric Light Company. The latter will at once install an electric lighting plant.

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THE Citizens Association of Bath Beach Junction—a suburb to the south of Brooklyn, N. Y.—favor the immediate construction of a gas works at that point. Such an enterprise ought to meet with success in the locality noted, for the Junction, together with the surrounding hamlets, probably contains 8,000 population. Piping could be performed there at a very low cost.

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MUCH damage was done to the gas plant (operated in connection with the Bennington, Vt., Knitting Company's works) at Bennington, by a fire, the origin of which is returned as "unknown."

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MAYOR OLIVER, of Lockport, N. Y., after all his haggling about the purchase for operation by the city of an electric lighting plant, has attached his signature to a contract which awards the local Gas and Electric Light Company the privilege of lighting the public lamps and buildings for another year, with the right to renew it then for three years more. The Mayor, however, insists that his pet project shall be submitted to votes of the people at the charter election in April next. Does his Honor seek vindication?

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To the Eastern gas maker, who is not infrequently obliged to clear out his yard by offering coke at retail at 5 cents per bushel, it will be reassuring to note that the Jefferson City (La.) Gas Light Company lately announced its willingness to dispose of freshly-made gas coke, at the rate of 35 cents per barrel in 10-barrel lots. This, by-the-way, being an especially reasonable retail rate for the locality.

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MESSRS. R. B. AVERY, Ralph Wright, R. F. Smith, F. Moore and W. B. Jessup have incorporated, at San Diego, Cal., the Avery Petroleum Gas and Fuel Company. The Company is capitalized in $10,000,000, of which it is claimed three millions have been paid in. It is proposed, we believe, to construct fuel gas plants for the operation of smelters. Gas men will not likely get very enthusiastic over the Avery outlook in California.

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THE following, from the Philadelphia *Telegraph* (14th inst.), is given for what it is worth: "The electric lighting companies appear to be fearful of the outcome of the suit brought by the Edison Company, and are combining for mutual protection and safety. The Edison is now strongly intrenched, and is making a determined effort to secure a permanent injunction which will drive all other electric lighting companies, including the Westinghouse, its most powerful rival, out of the field. If the Company wins the suit it will have a monopoly in this country similar to that enjoyed by the Bell Telephone Company. One of the

officials of the local Edison Company said to-day that there was every prospect of securing the desired injunction before the close of the year. The opposition electric lighting companies attempted some time ago to defeat the Edison, claiming, whenever the latter sought to secure an injunction, that its patents had expired. The Supreme Court has decided, however, that the point that an American patent is affected by the life of a foreign patent is not well taken. Under the ruling in the celebrated Bates refrigerating case a patent taken out in this country is valid until the expiration of the greatest possible time that a patent can be extended abroad, which is 15 years. The United States Electric Lighting Company is the latest acquisition to the ranks of the companies arrayed against the Edison. The Westinghouse now owns a controlling interest in the corporation, which was in such a condition that Westinghouse got it, it is said, on his own terms. The Westinghouse Company assumed all the indebtedness of the United States concern, in return for which the Westinghouse Company was enabled to secure the controlling interest. The indebtedness assumed, it is authoritatively stated, is about $1,500,000, or exactly one-half of the ostensible capital stock of the United States Company. The present capital stock of the Westinghouse Company is estimated at $12,000,000. It either owns or has a controlling interest in five different electric lighting companies—the Sawyer-Man Electric Lighting Company, of New York; the Consolidated Electric Company, of New York; the Waterhouse Company of Hartford, Conn.; the Tesla Motor Company, of Newark, N. J., and the United States Electric Lighting Company. The capital for the assumption of the indebtedness of the United States Company was furnished by American speculators. The Westinghouse is the strongest of the opposition companies, and its strength lies in the fact that its backers are very wealthy, and are influential, and that they are now contemplating an alliance with the Edison. Such an alliance would practically settle the points involved, and it is not unlikely that it will be made. The local Edison Company will begin operations in a few days. Lights will be furnished in the territory bounded by the two rivers and Market and Walnut streets."

THE Peoria (Ills.) Gas Specialty Company has been organized by Messrs. J. Elder, J. N. Whelpley, and R. L. Lannies. The chief object is the manufacture of gas machines.

AMONG other things that recently held the attention of the Boston City Council, may be noted the following: The order for the appointment of a special committee to consider the subject of electric lighting, to include the practicability and expediency of the erection and maintenance by the city of an electric light plant, said committee to report recommendations with a view of reducing the cost to the city of such lighting, was amended so that the committee shall also consider the practicability of including other lighting methods, and also of the establishment by the city of a municipal gas works. The amended resolutions were adopted.

THE agitation for cheaper gas in Philadelphia still continues, and it is more than likely that the present Councils (the new boards will take office in April next) will attempt to pass a resolution authorizing the establishment of a rate equal to $1.25 per 1,000—a reduction of 25 cents per 1,000.

MR. HENRY C. SCOTT, of St. Louis, Mo., who is largely interested in western gas enterprises, was asked the other day about his opinion in respect to electric lighting and gas lighting. The substance of his response was that gas will always be largely used for lighting, and that as electric lighting does not seem to be paying very well, gas might, in many instances, supersede electricity. He admitted that there was room for invention, and that the lighting business in general, at the present time, was in an unsatisfactory or unsettled condition.

PERHAPS the reason for Mr. Scott's last conclusion may be found in the fact that the people of Pine Bluff, Ark., are anxious to partake of a mixed system of street lighting—gas and electric—in lieu of the simplified gas plan now followed, the contract for which is held by the Southwestern Light and Improvement Company, of which Company Mr. Scott is General Manager. In any event, Mr. Scott is preparing to take hold of the task, for he is now engaged in installing an Edison plant.

THE bid rate for stock in the Municipal Gas Company, Troy, N. Y., is returned at 120; and holders show no disposition to part with it at that figure.

WRITING under date of the 13th inst., Mr. E. C. White, Secretary of the Fresno (Cal.) Gas and Electric Light Company, says: "Our plant is comparatively small. To-day we have a 30,000-foot holder, and also one of 8,000. Three years ago we operated the smaller one only, but to day our city (three years ago it had 1,000 inhabitants) holds 15,000 people. Our purifiers (two in number) are only 5 ft. by 5 ft. Would you think we could purify at all? We are, of course, making great improvements right along, but it takes lots of coin to keep pace with the city. In addition to our gas works we also operate an arc light plant of the Waterhouse type, and at present run 90 lights. As there is a great demand for more of them, as soon as it can be placed, we will give them 150 lights furnished from a 175-horse power Westinghouse engine. Of course this does not interest you; but I think our work deserves mention. Our gas shows a candle power of 19 right along. About the price of gas I might better say nothing, for in your last you lectured us on prices. Still, our coal comes to us by rail clear from San Francisco, and as the freight thereon costs us $5 per ton, perhaps our charge of $4 per thousand is not so excessive after all. Our capital stock is $500,000." But of course, Mr. White, these things do interest us, and our readers, too. No, with coal at presumably something like $13.50 per ton, we do not believe that a charge of $4 per thousand cubic feet is excessive—especially when a candle power that averages at 19 is retailed. We do, however, think that the Fresno Company is capitalized at a sufficiently large total. In fact, if it were cut down a trifle we do not believe that its best interests would suffer any because of the pruning knife.

THE struggle as to whether North Brookfield's Selectmen shall license the Quahoag Gas and Electric Lighting Company, or the North Brookfield Electric Company, to artificially illuminate this pretty Massachusetts township is still on the cards. Something over a week ago the Selectmen listened to argument from the proprietors of the last-named Company for the right to string wires and erect poles, and the authorities subsequently gave the petitioners leave to withdraw—one Massachusetts way of saying "No." The petition of the Quahoag Company has been presented to the authorities, and argument thereon will be had at an early date. We understand that Luther Hill, of Spencer, Mass., is the prime mover in the Quahoag Company, and that if the Selectmen look with favor on his petition he will at once begin the work of plant installation. North Brookfield is a township of Worcester county, Mass., and is about 15 miles west of Worcester. A spur of the Boston and Albany Railroad connects it with East Brookfield, which is directly on the line of the road named. It has a population of about 5,500, and is a thriving place.

SHARES in the California Electric Light Company, of San Francisco, Cal., have developed a very weak feeling in the last fortnight, one lot of 900 having been disposed of at 21—a decline of 5 points—although a reaction in the market brought them back to 23¾. This Company, on its commercial business in San Francisco, has been paying a dividend of 20 cents per share per month, and even at 21 some of those who hold it have slight reason for dissatisfaction—especially those that about two years ago picked it up at 25 cents per share. The Hebraic one per cent. profit was surely their portion.

THE gas plant of the Bakersfield (Cal.) Gas and Electric Light Company is now in successful operation, and its promoters are congratulating themselves on the outlook.

AT the annual meeting of the Augusta (Ga.) Gas Company the following officers were chosen: Directors, Geo. T. Barnes, E. H. Schneider, T. G. Barrett, P. Walsh, and P. H. Langdon; President, Geo. T. Barnes; Secretary, H. B. Adams; Superintendent, Geo. S. Hookey. President Barnes, in his annual report, detailed the loss to the Company by the disastrous floods of last September (See JOURNAL, Jan. 7, 1889, p. 13), and recommended that in consequence thereof the current semi-annual dividend be cut down to 2 per cent. in lieu of the usual one of 3 per cent. There was no dissent to the proposition, which latter is in accord with the careful policy that has ever characterized the management of this sterling old Company.

THE Burlington (Vt.) Gas and Electric Light Company has reduced the rate on its commercial arc lights (extinguished, we believe, at 10 P. M.) to $5 each per month.

THE rates fixed by the Sparta (Ills.) Natural Gas Company are as follows: Open fireplaces, $1 to $1.25 each per month; cooking stoves, 75 cents to $1 each; burners, 10 cents each.

AT the annual meeting of the Petersburgh (Va.) Gas Light Company the following result was reached: Directors, John G. Dunn, Alex. Donnay, Geo. Davis, David Dunlop, N. T. Patteson and John McGill;

President, John G. Dunn; Secretary and Superintendent, W. H. Baxter; Treasurer, W. F. Spottiswoode.

MR. SULLIVAN is responsible for the presentation of a bill to the New York State Assembly which provides that the gas bills forwarded each month to gas consumers shall carry a notice, printed "plainly and conspicuously," to the effect that the consumer is by law entitled to have his meter tested by the gas company that supplies him with gas, and that if the consumer is dissatisfied with such test he may have it reinspected by the State Inspector, without expense to him if said meter is found to be incorrect. Mr. Sullivan's slogan also insists that the consumer shall not be compelled to pay the bill unless the notice is printed on the statement in ink different in color to that from the balance of the wording on the statement. What next? Why not specify the color with which the meter itself is to be painted; or why not ask that the meter inspector be obliged to make his call clad in a swallow tail? or—but what is the use of adding to it?

IF Ald. Hodgdon, of the town of Lake, whose views on municipal lighting were aired at length in our issue for the 11th inst., were to pay more attention to devising ways and means to pay for the gas already consumed by the city, he might be entitled to some consideration as an honest public servant. For instance, the authorities there have run behind in their payments to the gas company some $45,000, and yet Hodgdon and his like amuse themselves by shouting loudly over the greed of the gas suppliers. The man who pays his bills is rather liked, and even if he does not tell his neighbor that he pays as he goes, it is nevertheless a fact that that neighbor manages to find it out—especially if the neighbor "is in trade." Wherefore we would advise Hodgdon *et al*, to mend their credit.

THE proprietors of the Portsmouth (N. H.) Gas Company managed to squeeze out an extra semi-annual dividend of 7½ per cent. this last half. Pretty good return, certainly; but perhaps we are soon to hear about a reduction in gas rates up that way.

THE Louisville Gas Light Company has ordered a second specimen of the Standard "Washer-Scrubber."

THE Miner Globe street lamp holds favor with the gas makers of the States, and its record is one of merit and worth.

THE final test of the plants recently constructed at Washington, Mo., by the Inter-State Gas and Water Works Company, having resulted satisfactorily, the same have been accepted by the City Council.

REFERENCE is made elsewhere to the damage by fire of a gas plant at Bennington, Vt. It should have been explained that the Valentine Knitting Company was the owner thereof. The mills were supplied with gas from the damaged property, as also were the residences of A. B. Valentine, and Olin Scott, the public school, and the First Baptist Church. The works will be rebuilt immediately. The Knitting Mills meanwhile are operated only on quite bright days, for President Valentine will not run the risk of using kerosene as an illuminator.

JANESVILLE, Wis., had a gas explosion the other day. The marble works of F. A. Bennett being the scene thereof.

THE North Buffalo (N. Y.) National Gas Fuel Company has been incorporated. Its executive management is thus returned: Directors, Herman Henning, Geo. Denner, Jacob Busch, D. H. Turner, A. J. Simon, Ed. L. Keyser and F. Busch; President, H. Henning; Vice-President, Geo. Denner; Secretary, D. H. Turner. The objects are the manufacture and supply of gas for lighting the streets and the public and private buildings in Buffalo, Tonawanda, Amherst and Cheektowaga. Buffalo enjoys a number of such institutions just now, but perhaps the projectors of this one count on a fair share of municipal favor, since certain Aldermen of the city are said to be interested in it. Nevertheless, we do not think they will capture the lighting of Buffalo offhand.

IT is reported that a branch of the Westinghouse Company is to be located in Batavia, N. Y., Mr. Russell L. Kinsey having secured a concession from the authorities which guaranteed the Westinghouse folks "an exclusive call" for 6 months on the right to erect an electric incandescent plant in the town.

THE Street Commissioners of Flatbush (N. Y.) have again contracted with the local gas company for the public lighting. The rate charged is $26 per lamp per annum.

THE contractors are preparing to excavate for the buildings to house the branch Edison incandescent lighting plant for Brooklyn, N. Y.

## Correspondence

[The JOURNAL is not responsible for the opinions expressed by correspondents.]

### Cases of Gas Poisoning, Yonkers, N. Y.

YONKERS, N. Y., Feb. 18, 1889.

To the Editor AMERICAN GAS LIGHT JOURNAL:

Gentlemen:—I enclose herewith a clipping from the Yonkers *Statesman*, date of Feb. 14th. [We herewith reprint the clipping.—Eds.]

"This morning S. Howard Howes, Jr., was found dead in his bed in the Mansion House, South Broadway, where the family are boarders. It appears that he kissed his mother good night about 12 o'clock, and retired to sleep in room 19, third floor, facing South Broadway, and commanding a fine view of the Hudson River.

"This morning, about 6 o'clock, a servant detected a strong smell of gas issuing from the room. She reported the matter, and the room door was broken open. There the young man was found on his bed, in a state of unconsciousness. Dr. Robert N. Flagg, who resides in the neighborhood, was hastily summoned. He promptly attended, and pronounced the youth dead, and the cause of death was doubtless asphyxia. He had been dead about two hours.

"On the side of the south wall of the room there is a gas bracket. On this there is a brass tube on which to connect a rubber pipe to convey gas to a gas stove to heat the room. The tube projects downwards, and the flow of gas through it is regulated by a stop-cock. The rubber pipe had no brass cap to fit on to the tube, but was simply drawn over the end of the tube, and held there by its own property of contraction. The rubber pipe was found to have fallen from its connection with the brass tube. On examination the end was seen to have been split, and this caused it to loosen its hold. The gas was turned on to the stove, and when the rubber pipe parted the gas had full flow into the room.

"Franklin A. Rigby, undertaker, was called, and he telephoned to Coroner Matthews of New Rochelle. The Coroner arrived without delay, and proceeded to summon a jury to hold an inquest into the cause of death. The jury viewed the body, and the inquest was postponed till 2 o'clock this afternoon.

"The deceased was a youth of excellent character and bright intellect, and held a position in the Auditor's office of the New York Central and Hudson River Railroad Company, at 42d street, New York."

"*A Dangerous Contrivance.*—It will be remembered by many of our readers that on Wednesday morning, Nov. 28, William K. McEwen, of Norwalk, Conn., was found dead in a room in the house of Mrs. Ash, No. 46 Warburton avenue, and that his death was caused by escaping gas from a contrivance in the room intended to heat a stove. The untimely death of young Howes is due to the same cause—so that, within less than three months, two valuable lives have been sacrificed by this contrivance.

"The question arises whether these gas stoves should be permitted in bed-rooms—at least until they can be made more safe than they seem to be at present."

It may not be clear to you that the "brass tube" spoken of is an independent cock. The young man had the gas at the burner and in the stove burning, and when the rubber tube dropped, the supply was cut off from the stove, and the pressure was suddenly reduced at the burner, and both were extinguished.

The case spoken of as happening on Nov. 28th was not due to exactly the same cause, as the clipping states. McEwen retired, and in some unexplained way turned on the independent cock (there was no stove in this case, it having been removed), and also turned on the gas to the burner. The latter he lighted, and getting into bed, proceeded to read a story ("Cressy") in the New York *World*. At 2 A. M. Mrs. Ash was awakened by the smell of gas. She tried all the burners in the house, and as a last resort knocked at McEwen's door and asked if the gas was "all right," as she smelled it all over the house. He replied that everything was right, and that he had the gas burning. At 3 A. M., again becoming uneasy, Mrs. Ash made another tour of inspection, and as before, knocked at McEwen's door and asked if he was sure the gas was not escaping in his room. This time he answered in a provoked tone that the gas was "all right."

In the morning, when McEwen had not appeared, and knocking failed to arouse him, the door was forced. McEwen was in bed, dead, with the newspaper before him, in an attitude of reading. The gas at the burner was still burning and the independent cock turned on full, and the room consequently was filled with gas. Why this gas did not explode is a mystery, but such was the case.

I am yours truly, YONKERS.

## The Market for Gas Securities.

Consolidated jumped to 83⅝ within the week, and closed strong. Equitable is less inquired after but seems a bargain to us at anything below 115. Mutual holds its own quite well, some 225 shares having been taken at auction at 98, and 98¼ was offered the purchaser right after the block was sold. Standard common made its appearance the other day in an auction sale. That which was offered brought 50, but brokers assert that it can be freely obtained at 48. Brooklyn shares hold their own, particularly Citizens, which it is said will soon astound gas magnates in the City of Churches. The rumor is that certain capitalists are moving to secure control in it, and that other capitalists, to head off the first set, are making overtures for control. Between them, the stockholders of the class known as the minnow are likely to obtain some salve for the burns inflicted on their bodies in the famous deal of a few years ago.

Another whirl in the Boston situation discloses the Bay State party clad in fresh costume. What we said a week ago was strictly true, but the exigencies of the situation are numerous. A bargain has been made between the controllers of the pooled Boston stock and the Bay State Company, by which the latter, on the 29th of March, agrees to pay the pool at the rate of $1,200 cash per share for its old Boston holdings. If the trade is not consummated the Bay State dickerers will forfeit $100,000. In the meantime, through the vehicle of the public prints, the Bay State syndicate has appealed to the general public to come forward and take up $7,000,000 "five per cent. sinking fund trust bonds" (*part* of a *total* authorized issue of 12 millions) in order that the cash may be obtained. We would rather put our money even in Chicago Trusts. The general situation is favorable.

## Gas Stocks.

**Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks.**

16 Wall St., New York City.

February 25.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share. ☜

| | Capital. | Par. | Bid | Asked |
|---|---|---|---|---|
| Consolidated | $35,430,000 | 100 | 83⅛ | 83¾ |
| Central | 466,000 | 50 | — | — |
| " Scrip | 220,000 | — | 47 | 57 |
| Equitable | 2,000,000 | 100 | 112 | 117 |
| " Bonds | 1,000,000 | — | 113 | 115 |
| Harlem, Bonds | 170,000 | — | — | — |
| Metropolitan, Bonds | 658,000 | — | 115 | 118 |
| Mutual | 3,500,000 | 100 | 98 | 100 |
| " Bonds | 1,500,000 | — | 100 | 102 |
| Municipal, Bonds | 750,000 | | — | — |
| Northern | 125,000 | 50 | 30 | — |
| " Scrip | 108,000 | | | |
| Yonkers | | 50 | 90 | 100 |
| Richmond Co., S. I. | 300,000 | 50 | 55 | 60 |
| " Bonds | 12,000 | — | — | — |

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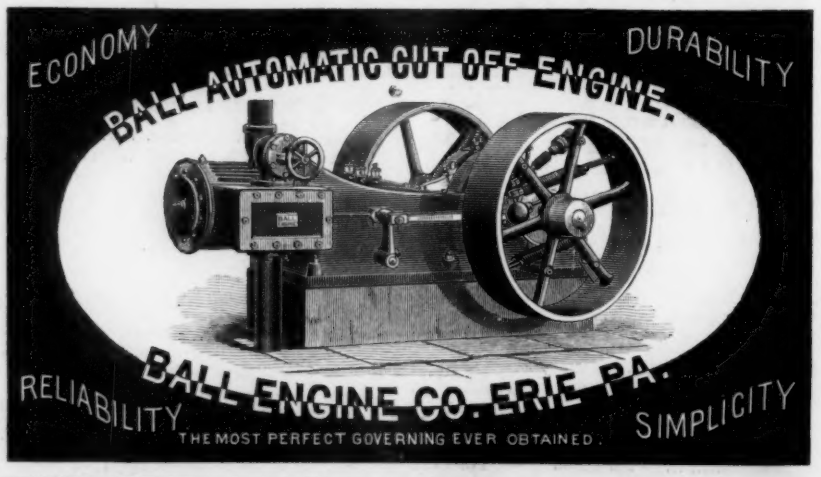


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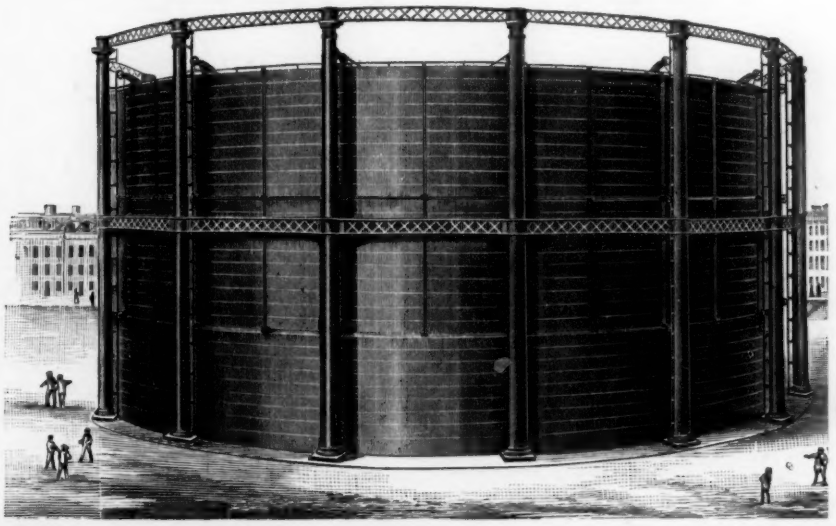

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**THIRTY-CANDLE, NON-CONDENSABLE, FIXED GAS. THE MOST SUCCESSFUL GAS PROCESS IN OPERATION.**

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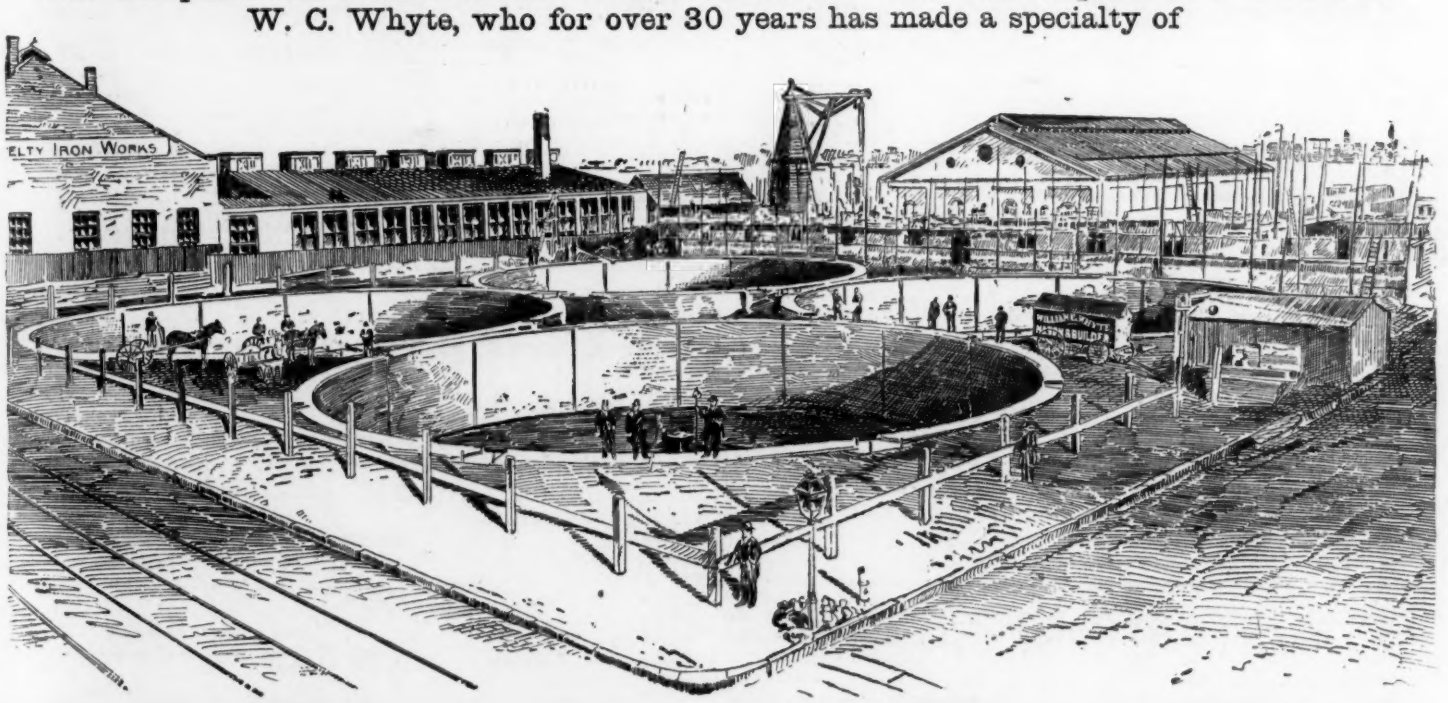
**Gas Companies and others about to erect Gasholders will find it profitable to consult W. C. Whyte, who for over 30 years has made a specialty of**

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**Fifty Tanks now in operation show the sort of work done. Address**

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# KIRKHAM, HULETT & CHANDLER, LIMITED.

## PATENT "STANDARD" WASHER-SCRUBBERS

## Erected and in course of construction at present date:

| | Capacity. Cubic feet per day. |
|---|---|
| Altrincham | 600,0 0 |
| Adelaide | 600,000 |
| Aldershot | 200,000 |
| **Allegheny, U. S. A** | 1,000,000 |
| Ashton-under-Lyne | 1.250,000 |
| Amsterdam | 1,500,000 |
| " | 1,500,000 |
| Annaberg | 200,000 |
| Arcachon | 100,000 |
| Animal Charcoal Co | 200,000 |
| **Altoona, U.S.A.** | 350,000 |
| Buxton | 250,000 |
| Bradford | 1,000,000 |
| " | 1,250,000 |
| " | 1,250,000 |
| " | 1,250,000 |
| " | 1,000,000 |
| " | 1,000,000 |
| " | 3,000,000 |
| Bremen | 150,000 |
| **Baltimore, U.S.A.** | 1,000,000 |
| " | 1,000,000 |
| " | 1,000,000 |
| Balmain, N.S.W | 125,000 |
| Bishops Stortford | 150,000 |
| Blackpool | 400,000 |
| Brussels | 1,250,000 |
| " | 1,250,000 |
| " | 750,000 |
| " | 1,250,000 |
| Banbury | 250,000 |
| Birmingham | 5,000,000 |
| Birkenhead | 2,500,000 |
| Blackburn | 1,500,000 |
| Bochum | 600,000 |
| Burntisland | 250,000 |
| **Boston, U.S.A.** | 2,000,000 |
| Brisbane | 1,500,000 |
| " | 300,000 |
| Burton-on-Trent | 1,500,000 |
| Barcelona | 350,000 |
| Barking | 100,000 |
| Baerlien & Co | 20,000 |
| " | 20,000 |
| Bombay | 400,000 |
| **Buffalo, U.S.A., Mutual** | 750,000 |
| " **Citizen** | 500,000 |
| **Brookline, U.S.A.** | 500,000 |
| Bergen | 350,000 |
| Berlin | 1,250,000 |
| Bournemouth | 1,000,000 |
| **Bridgeport, U.S.A** | 500,000 |
| Brunswick | 300,000 |
| **Beck & Co., St. Louis** | 100,000 |
| Barmen Rittershausen | 600,000 |
| Bexhill | 125,000 |
| **Brooklyn, U.S.A** | 1,000,000 |
| " | 1,000,000 |
| " **Nassau** | 1,000,000 |
| Brunner, Mond & Co. | 400,000 |
| Cheltenham | 2,000,000 |
| Cannes | 200,000 |
| Croydon | 1,500,000 |
| Copenhagen | 200,000 |
| Clevedon | 200,000 |
| **Columbus, U.S.A** | 500,000 |
| **Cincinnati,** " | 1,500,000 |
| " " | 1,500,000 |
| **Chicago** " | 3,000,000 |
| " " | 1,000,000 |
| " " | 1,000,000 |
| Chemnitz | 1,000,000 |
| Crewe | 1,250,000 |
| Colonial Gas Works Co | 100,000 |
| Cadiz | 300,000 |
| Charlottenburg | 600,000 |
| Dudley | 750,000 |
| Driffield | 100,000 |
| Dukenfield | 500,000 |
| Dover | 750,000 |
| " | 1,000,000 |
| Deal | 200,000 |
| Derby | 1,500,000 |

| | Capacity. Cubic feet per day. |
|---|---|
| Dublin | 3,000,000 |
| Dowlais | 100,000 |
| Douai | 500,000 |
| Denton | 500,000 |
| **Derby, U.S.A** | 350,000 |
| **Denver,** " | 500,000 |
| " " | 1,000,000 |
| Dusseldorf | 750,000 |
| " | 500,000 |
| Dumfries | 250,000 |
| Dunedin, N.Z | 400,000 |
| Darlington | 1,250,000 |
| **Detroit, U.S.A** | 750,000 |
| Edinburgh | 1,500,000 |
| " | 2,000,000 |
| Enfield | 300,000 |
| Essen | 300,000 |
| Elbing | 150,000 |
| Falmouth | 150,000 |
| Frankfort | 300,000 |
| Farnworth | 400,000 |
| Fenton | 400,000 |
| Friedenshutte | 500,000 |
| Furth | 400,000 |
| Freiburg | 200,000 |
| Goole | 250,000 |
| Glossop | 300,000 |
| Guildford | 300,000 |
| Gloucester | 1,250,000 |
| Gera | 300,000 |
| Grafton, N.S.W | 100,000 |
| Grieg | 300,000 |
| **Georgetown, U.S.A** | 250,000 |
| Gluckauf | 200,000 |
| Heywood | 600,000 |
| Holywood | 125,000 |
| Huy | 70,000 |
| Harrow | 250,000 |
| Harrogate | 250,000 |
| Halstead | 150,000 |
| Heilbronn | 200,000 |
| **Havana, Cuba** | 750,000 |
| Hastings | 1,500,000 |
| Huddersfield | 300,000 |
| " | 750,000 |
| " | 1,500,000 |
| Hof | 200,000 |
| Hampton Wick | 500,000 |
| Heckmondwicke | 500,000 |
| Haverfordwest | 100,000 |
| **Halifax, N.S** | 350,000 |
| Hamm | 200,000 |
| Halle | 400,000 |
| Heidelberg | 300,000 |
| **Hartford, U.S.A** | 1,000,000 |
| Ilkeston | 300,000 |
| Inverness | 250,000 |
| Ilkley | 200,000 |
| Ilford | 100,000 |
| Kingston-on-Hull | 400,000 |
| Kidderminster | 750,000 |
| Kidsgrove | 100,000 |
| Konigberg | 1,000,000 |
| King's Lynn | 300,000 |

**LONDON:—**

| | |
|---|---|
| The Gaslight and Coke Co.: | |
| Beckton | 1,250,000 |
| " | 1,250,000 |
| " | 1,250,000 |
| " | 1,250,000 |
| " | 1,250,000 |
| " | 1,250,000 |
| " | 2,500,000 |
| " | 2,500,000 |
| Silvertown | 1,000,000 |
| Bromley | 2,000,000 |
| " | 1,500,000 |
| " | 1,500,000 |
| " | 1,500,000 |
| " | 2,000,000 |
| " | 1,500,000 |

| LONDON—*Continued.* | Capacity. Cubic feet per day. |
|---|---|
| Shoreditch | 2,500,000 |
| Pancras | 1,500,000 |
| " | 1,500,000 |
| Pimlico | 2,000,000 |
| Nine Elms | 3,000,000 |
| " | 3,000,000 |
| South Metropolitan Co:— | |
| Greenwich | 3,000,000 |
| Woolwich | 400,000 |
| Vauxhall | 3,000,000 |
| " | 3,000,000 |
| Lea Bridge | 300,000 |
| West Ham | 1,500,000 |
| Leeds | 2,000,000 |
| " | 3,000,000 |
| " | 3,000,000 |
| " | 3,000,000 |
| " | 3,000,000 |
| " | 2,000,000 |
| Leominster | 150,000 |
| Leiden | 560,000 |
| " | 600,000 |
| Liverpool | 2,000,000 |
| " | 2,000,000 |
| " | 2,000,000 |
| " | 2,000,000 |
| " | 2,000,000 |
| " | 3,000,000 |
| Lincoln | 1,000,000 |
| " | 600,000 |
| **Lowell, U. S. A** | 1,000,000 |
| **Louisville** " | 1,500,000 |
| Long Eaton | 500,000 |
| Lilie | 900,000 |
| " | 450,000 |
| " | 750,000 |
| " | 250,000 |
| " | 250,000 |
| Luckenwalde | 330,000 |
| Liegwitz | 300,000 |
| **Lincoln, U. S. A** | 250,000 |
| **Lawrence** " | 500,000 |
| **Lynn** " | 300,000 |
| Lyons | 1,500,000 |
| Maidstone | 1,000,000 |
| Marseilles | 1,500,000 |
| " | 1,500,000 |
| Mons | 500,000 |
| Malines | 250,000 |
| Melbourne | 1,500,000 |
| " | 1,500,000 |
| " | 1,500,000 |
| " | 1,500,000 |
| " | 1,500,000 |
| Manchester | 2,500,000 |
| Middleton | 400,000 |
| Manley, N. S. W | 100,000 |
| **Minneapolis, U. S. A** | 750,000 |
| Magdeburg | 300,000 |
| **Memphis, U. S. A** | 750,000 |
| Nottingham | 1,250,000 |
| " | 2,500,000 |
| " | 2,500,000 |
| " | 2,000,000 |
| " | 1,500,000 |
| " | 2,000,000 |
| **Newport, U.S.A** | 430,000 |
| Newmarket | 150,000 |
| **Newark, U.S.A** | 680,000 |
| Northfleet | 200,000 |
| **New York, U.S.A** | 2,000,000 |
| Nice | 600,000 |
| Newcastle, N. S. W | 200,000 |
| Numea, " | 100,000 |
| Namur | 250,000 |
| Newark | 350,000 |
| Oldbury | 500,000 |
| Otley | 200,000 |
| Oswestry | 250,000 |

| | Capacity. Cubic feet per day. |
|---|---|
| Ober Schlesian | 1,500,000 |
| Otto & Co.'s Coke Works | 1,500,000 |
| Plymouth | 2,000,000 |
| Parramatta, N. S. W | 100,000 |
| Prescott | 150,000 |
| **Providence, U.S.A** | 750,000 |
| " | 750,000 |
| Plauen | 300,000 |
| " | 300,000 |
| Portsmouth | 2,500,000 |
| " | 2,500,000 |
| **Pittsburgh, U.S.A** | 1,500,000 |
| **Portland,** " | 560,000 |
| **Pawtucket,** " | 500,000 |
| **Quebec** | 250,000 |
| Radcliffe | 750,000 |
| Rouen | 250,000 |
| Ramsgate | 1,000,000 |
| Reigate | 200,000 |
| **Richmond, U.S.A** | 250,000 |
| **Roxbury,** " | 500,000 |
| Runcorn Soap Co. | 20,000 |
| Rockhampton, N. S. W | 125,000 |
| Richmond | 1,500,000 |
| Reading | 2,000,000 |
| Reichenbach | 200,000 |
| Salford | 1,750,000 |
| " | 1,750,000 |
| " | 1,750,000 |
| Smethwick | 750,000 |
| Sydney, N. S. W | 1,000,000 |
| " | 1,000,000 |
| " | 2,500,000 |
| " | 50,000 |
| " | 50,000 |
| Sunderland | 1,500,000 |
| **St. Josephs, U.S.A** | 250,000 |
| Spa | 100,000 |
| Sevenoaks | 300,000 |
| St. Petersburg | 2,000,000 |
| " | 1,500,000 |
| **St. Louis, U.S.A** | 2,000,000 |
| " | 2,000,000 |
| " | 1,000,000 |
| **Laclede** | 1,000,000 |
| Silesian Coal Co. | 600,000 |
| **San Francisco, U.S.A** | 2,000,000 |
| " | 2,000,000 |
| Sheepbridge Coal Co. | 40,000 |
| Stettin | 200,000 |
| Singapore | 300,000 |
| Sutton | 500,000 |
| Tonbridge | 150,000 |
| Tipton | 400,000 |
| Tottenham | 1,000,000 |
| **Toledo, U.S.A** | 750,000 |
| **Toronto** | 1,000,000 |
| Uxbridge | 300,000 |
| **Valparaiso** | 500,000 |
| West Bromwich | 1,000,000 |
| Willenhall | 250,000 |
| Weston-super-Mare | 500,000 |
| Waltham | 150,000 |
| Wormwood Scrubs | 300,000 |
| **Williamsburg, U.S.A** | 600,000 |
| " | 600,000 |
| Wellington | 150,000 |
| Warwick | 300,000 |
| **Wheeling, U.S.A** | 500,000 |
| Walker | 300,000 |
| Westgate | 100,000 |
| **Wilmington, U.S.A** | 500,000 |
| Windsor, N. S. W | 100,000 |
| Wolverton | 100,000 |
| Wellington, N. Z. | 250,000 |
| Whitchurch | 175,000 |
| **Washington, U.S.A** | 2,000,000 |
| Wallasey | 750,000 |
| Weimar | 150,000 |
| Wurzen | 200,000 |
| **Worcester, U.S.A** | 750,000 |
| Yeadon | 500,000 |
| Yeovil | 250,000 |

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| | |
|---|---|
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| Decatur Gas Light and Coke Co. | Decatur, Ill. |
| Niles Gas Light Co. | Niles, Mich. |
| Newton Illuminating Co. | Newton, Kansas. |
| Wellington Light and Heat Co. | Wellington, Kansas. |
| Chippewa Falls Gas Light Co. | Chippewa Falls, Wis. |
| Elkhart Gas Light and Coke Co. | Elkhart, Ind. |
| Madison City Gas Light Co. | Madison, Wis. |
| South Bend Gas Light Co. | South Bend, Ind. |
| Sheboygan National Gas Co. | Sheboygan, Wis. |
| Salina Gas Light Co. | Salina, Kansas. |
| The Rathbun Co. | Deseronto, Prov. Ont. |
| Jefferson City Gas Light Co. | Jefferson City, Mo. |
| Mankato Gas Light Co. | Mankato, Minn. |
| Minneapolis Gas Light and Coke Co. | Minneapolis, Minn. |
| Lima Gas Light Co. | Lima, Ohio. |
| Bellevue Water and Fuel Gas Light Co. | Bellevue, Campbell County, Ky. |
| Bucyrus Gas Light and Fuel Co. | Bucyrus, Ohio. |
| Morris Gas Co. | Morris, Ill. |
| Los Angeles Gas Co. | Los Angeles, Cal. |
| San Diego Gas Fuel and Electric Lt. Co. | San Diego, Cal. |
| Jackson National Gas Co | Jackson, Mich. |
| Sioux Falls Gas Co. | Sioux Falls, Dak. |
| Dakota Gas and Fuel Co. | Grand Forks, Dak. |
| St. Johns Mutual Gas Co. | St. Johns, Mich. |
| Stillwater Gas Light Co. | Stillwater, Minn. |
| St. Paul Gas Light Co. | St. Paul, Minn. |
| Emporia Electric and Gas Light Co. | Emporia, Kas. |
| Van Wert Gas Light Co. | Van Wert, Ohio. |
| Lansing Gas Light Co. | Lansing, Mich. |
| San Francisco Gas Light Co | San Francisco, Cal. |
| Shelbyville Gas Light Co. | Shelbyville, Ind. |
| Great Falls Gas Light Co. | Great Falls, N. H. |
| Belleville Gas Co. | Belleville, Ontario. |
| Rochester Light and Fuel Co | Rochester, Minn. |
| Northwestern Gas Light and Coke Co. | Evanston, Ill. |
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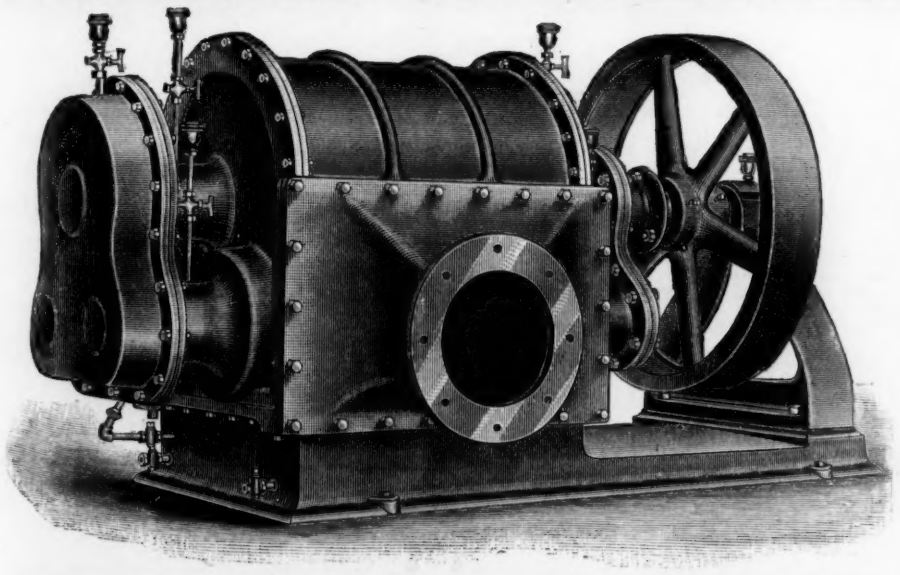

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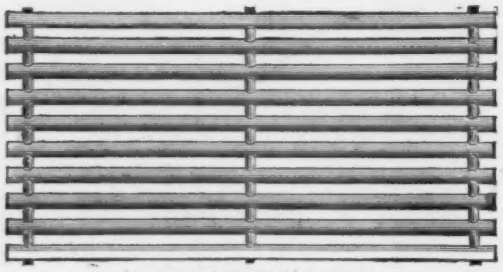

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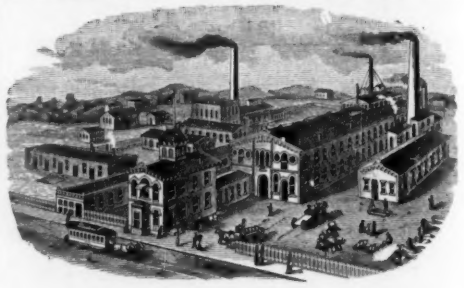

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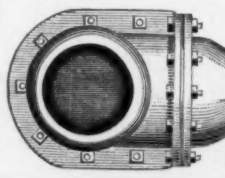

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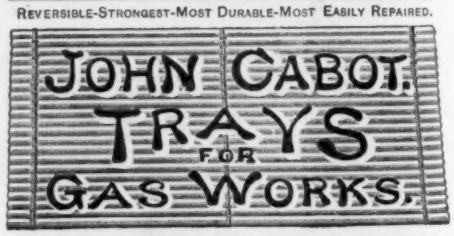


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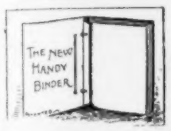


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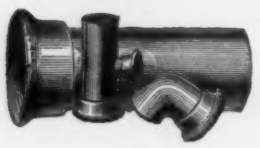

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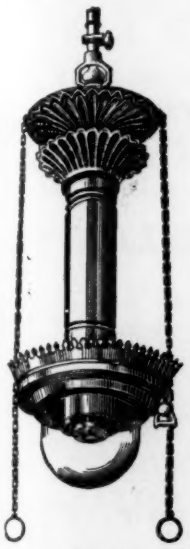

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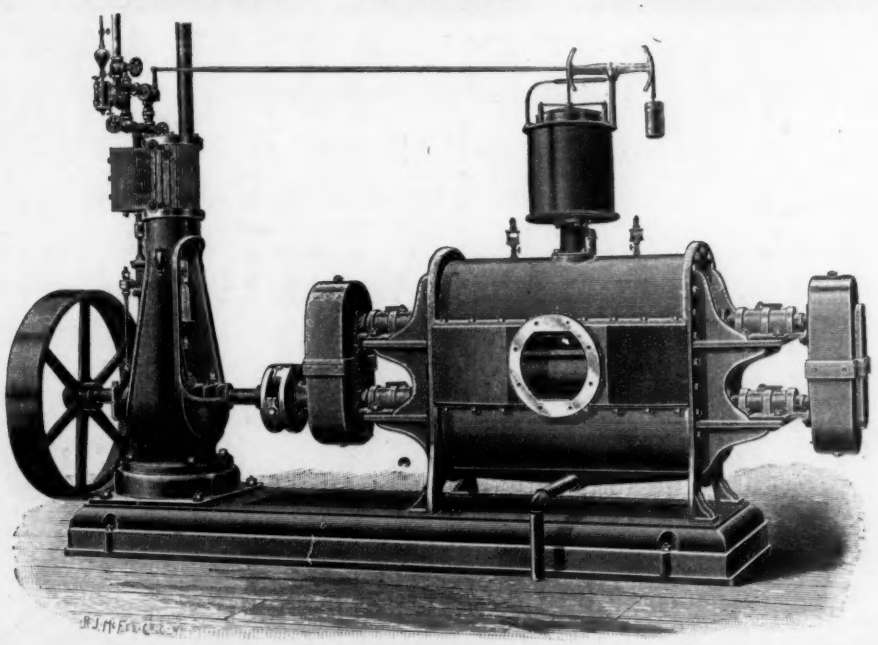

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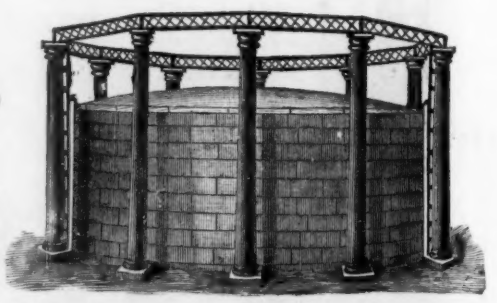

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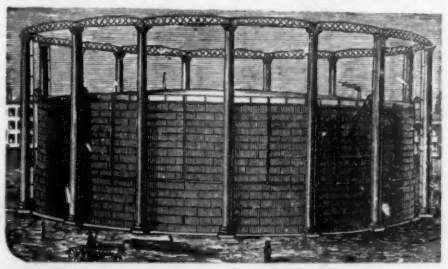

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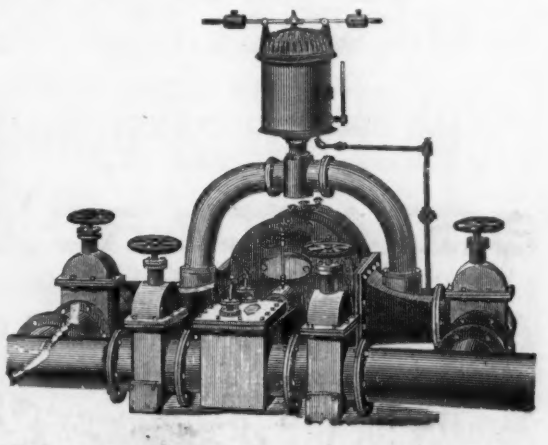

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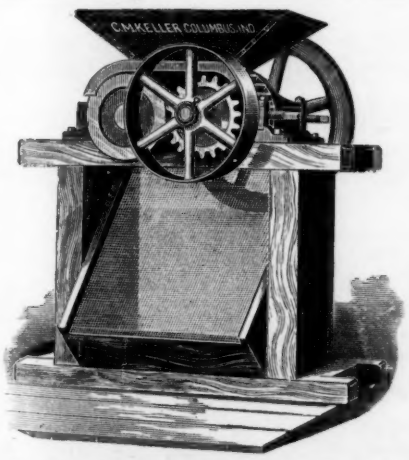


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| 50-H.P. STEAM ENGINE AND BOILER, Running a Plant of Fifty 2000-C.P. Arc Lamps 12 Hours. | |
|---|---|
| 4,500 lbs. Indiana nut and slack, at $1.30 per ton | $2 93 |
| Engineer, one night, at $50 per month | 1 67 |
| Trimmer, one day, at $40 per month | 1 33 |
| Superintendent or Electrician, one day, at $50 per month | 1 66 |
| Waste, etc., one day, at $20 per year | 05 |
| Water rent, one day, at $40 per year | 11 |
| Wheeling coal and removing ashes, at $4 per week | 58 |
| 100 pairs carbons, at $18.50 per 1000 | 1 85 |
| One pint cylinder oil, at 60 cents per gallon | 07 |
| One quart engine and dynamo oil, at 50 cents per gallon | 13 |
| Total | $10 38 |

| 50-H.P. OTTO GAS ENGINE, Running a Plant of Fifty 2000 C.P. Arc Lamps 12 Hours. | |
|---|---|
| 9,200 cu. ft. gas, at 42 cts. per M. (for cost of gas see items below) | $3 86 |
| Engineer not needed; engine is in care of Electrician or Supt. | .... |
| Trimmer, one day, at $40 per month | 1 33 |
| Superintendent or electrician, one day, at $50 per month | 1 66 |
| Waste, etc., one day, at $20 per year | 05 |
| Water rent dispensed with (cooling water used over and over) | .... |
| Handling of coal included in cost of gas | .... |
| 100 pairs carbons, at $18.50 per 1,000 | 1 85 |
| One pint cylinder oil, at 60 cents per gallon | 07 |
| One quart engine and dynamo oil, at 50 cents per gallon | 13 |
| Total | $8 95 |

Expenses of depreciation, repairs, and interest omitted, being considered the same in both cases—though depreciation and repairs are much higher with steam on account of boiler and its appurtenances. Cost of gas in the holder we estimate for most of the Middle and Western States as follows: Coal, 30 cts.; labor, 20 cts.; purification, 2 cts.; total, 52 cts. Less coke, 7 cts., and tar, 3 cts.; leaving net cost of gas 42 cts. The items of Superintendence and repairs, being paid for by the gas sold to consumers, need not be charged on extra output for gas engine consumption. Where the cost of gas is higher than here figured, coal for steam use will be found proportionally higher, and final figures of comparison show same amount of saving.

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